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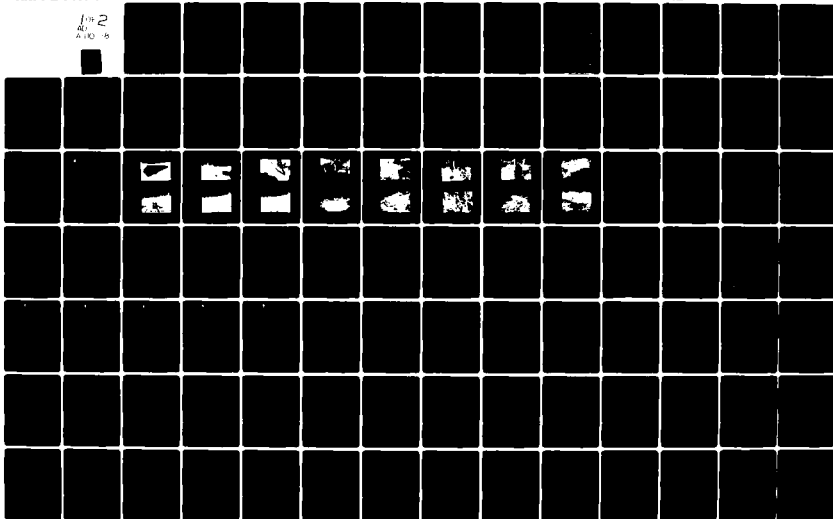
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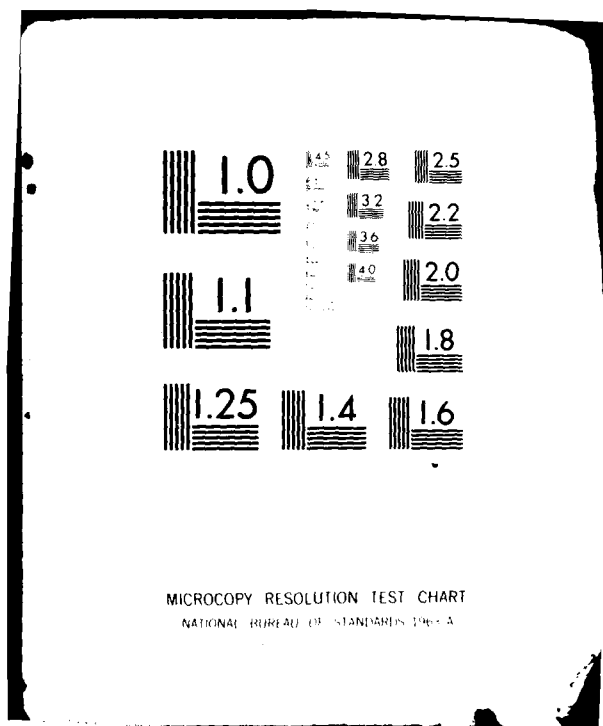
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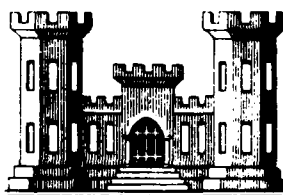
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## MOE POND DAM

OTSEGO COUNTY, NEW YORK  
INVENTORY No. NY 1269

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JAN 25 1982  
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# PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



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## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.



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BY	...
DISTRICT	...
APPROVED	...

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
MOE POND DAM  
INVENTORY NO. NY 1269  
SUSQUEHANNA RIVER BASIN  
OTSEGO COUNTY, NEW YORK

TABLE OF CONTENTS

	<u>PAGE NO.</u>
ASSESSMENT	-
OVERVIEW PHOTOGRAPH	-
LOCATION MAP	i
1 - PROJECT INFORMATION	1
1.1 GENERAL	1
1.2 DESCRIPTION OF PROJECT	1
1.3 PERTINENT DATA	3
2 - ENGINEERING DATA	5
2.1 GEOTECHNICAL DATA	5
2.2 DESIGN RECORDS	5
2.3 CONSTRUCTION RECORDS	5
2.4 OPERATION RECORDS	6
2.5 EVALUATION OF DATA	6
3 - VISUAL INSPECTION	7
3.1 FINDINGS	7
3.2 EVALUATION OF OBSERVATIONS	9
4 - OPERATION AND MAINTENANCE PROCEDURES	11
4.1 PROCEDURE	11
4.2 MAINTENANCE OF DAM	11
4.3 WARNING SYSTEM	11
4.4 EVALUATION	11

5 - HYDROLOGIC/HYDRAULIC	12
5.1 DRAINAGE AREA CHARACTERISTICS	12
5.2 ANALYSIS CRITERIA	12
5.3 SPILLWAY CAPACITY	12
5.4 RESERVOIR CAPACITY	13
5.5 FLOODS OF RECORD	13
5.6 OVERTOPPING POTENTIAL	13
5.7 EVALUATION	14
6 - STRUCTURAL STABILITY	15
6.1 EVALUATION OF STRUCTURAL STABILITY	15
6.2 STRUCTURAL STABILITY ANALYSIS	16
7 - ASSESSMENT/RECOMMENDATIONS	18
7.1 ASSESSMENT	18
7.2 RECOMMENDED MEASURES	19

#### APPENDICES

- A. PHOTOGRAPHS
- B. VISUAL INSPECTION CHECKLIST
- C. HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS
- D. PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS
- E. STRUCTURAL STABILITY ANALYSIS
- F. REFERENCES
- G. DRAWINGS

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Moe Pond Dam  
State Located: New York  
County: Otsego  
Watershed: Susquehanna River Basin  
Watercourse: Willow Brook  
Date of Inspection: April 9, 1981

ASSESSMENT

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies that need to be evaluated and remedied.

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped by all storms exceeding 62 percent of the Probable Maximum Flood (PMF). Consequently, the spillway cannot adequately discharge the peak outflow from the full PMF; however, it will pass one half the PMF. Therefore, the spillway is adjudged to be inadequate.

It is recommended that the following additional investigations be performed by a registered professional engineer engaged by the owner:

1. The present embankment sections adjacent to the spillway represent a potential hazard to the dam with respect to possible erosion, piping and/or failure of the dam during high reservoir levels. Therefore, regrade this area to make the embankment section conform to the embankment cross sections elsewhere. In addition, adequately protect these sections from spillway outflows.
2. Investigate the seepage that was observed near the downstream toe of slope, including observation during high and low reservoir levels, evaluate the cause and recommend appropriate remedial measures.

It is recommended that within 3 months of the final approval date of this report, all of the additional investigations should be initiated and within 18 months, appropriate remedial measures

should be completed.

The following remedial measures should be completed within 12 months to correct existing deficiencies:

1. Fill and regrade the major depression between the drop structure and the spillway, as well as the other local depressions along the embankment crest and downstream slope to restore a uniform embankment cross section. Reestablish vegetative cover in these areas.
2. Clear the brush and trees from the embankment, including stump removal and backfilling, establish a vegetative cover, and cut grass and weeds on the embankment at least annually.
3. Flatten the grade at the top of the upstream slope and provide riprap or alternate slope protection as required between the crest and the existing riprap to prevent future slumping and erosion due to wave action.
4. Ensure the reservoir drain and its controls are operational.
5. Repair the deteriorated concrete of the spillway and outlet works endwall.
6. Fill in the woodchuck burrow and any other burrows observed on the embankment slopes.
7. Remove all logs, debris and other obstructions from the spillway area.
8. Develop and implement a flood warning and emergency evacuation plan to alert downstream residents in the event conditions occur which could result in the failure of the dam.




9. A program for regular maintenance should be developed and implemented.

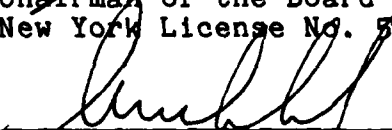
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Submitted by:

FLAHERTY GIAVARA ASSOCIATES, P.C.

  
\_\_\_\_\_  
Hugh C. Flaherty, P.E. & L.S.  
Chairman of the Board  
New York License No. 58508

Approved by:

  
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Col. W. M. Smith, Jr.  
New York District Engineer

Date:

14 Sep 81

NATIONAL DAM SAFETY PROGRAM  
PHASE I INSPECTION REPORT  
MOE POND DAM  
INVENTORY NO. NY 1269  
SUSQUEHANNA RIVER BASIN  
OTSEGO COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367. Flaherty Giavara Associates, P.C. has been retained by the New York District to inspect and report on selected dams in the State of New York. Authorization and notice to proceed was issued to Flaherty Giavara Associates, P.C. under a letter of December 24, 1980 from W. M. Smith Jr., Colonel, Corps of Engineers. Contract No. DACW 51-81-C-0006 has been assigned by the Corps of Engineers for this work.

b. Purpose

Evaluation of the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Moe Pond Dam consists of an earthfill embankment with a concrete spillway located near the left abutment. A concrete structure is located on the crest near the center of the dam. It appears to be a gate structure connecting to an 18 inch diameter cast iron pipe that outlets into the main discharge channel. The overall length of the dam is 222 feet. A plan, profile and section of the dam are shown in Appendix G.

The crest of the dam is 17.5 feet above the discharge channel and the crest width is approximately 12 feet. The upstream earthen slope varies from near vertical to 2 horizontal to 1 vertical from the crest to the reservoir level (a distance of 3+ feet at the time of visual inspection). Below the reservoir level, the upstream

slope appears to be much flatter and riprap-lined. The downstream slope is 2 horizontal to 1 vertical from the crest to a relatively flat berm about 9 to 10 feet below the crest. The downstream berm covers approximately the middle half of the dam and subsequently drops at slopes varying from 1.5 to 2 horizontal to 1 vertical, to the discharge channel, 7± feet below the berm.

Based on the 1934 drawings, the embankment consists of earthfill surrounding an interior concrete core. The core consists of a concrete wall with concrete fill on the downstream side. The wall begins several feet below the crest and extends below original ground surface to depths ranging from 4 to 15 feet to form a foundation cutoff. The core wall is 2 feet wide at its top and increases, in steps, to a 6 foot width at the bottom of the cutoff.

The spillway is approximately 15 feet wide, and consists of a concrete gravity section with no upstream or downstream retaining or abutment walls. The spillway discharge channel is about 7 feet wide and is excavated into earth about 2 feet. The channel retains this cross section and is gently sloping for a distance of 100+ feet downstream of the spillway. Thereafter, it curves to the right and fans out over a 20 to 30 foot width creating several narrow, very shallow channels, all of which drop steeply into the main discharge channel.

b. Location

Moe Pond Dam is located off New York Route 28/80 approximately 1.3 miles northwest of the Village of Cooperstown in the Town of Otsego, New York. The dam is located at latitude north 42°-42.8' and longitude west 74°-56.7' on the U.S. Geological Survey 7.5 minute series topographic map "Cooperstown, New York". The Location Map on page i indicates where the dam is situated.

c. Size Classification

The maximum height of the dam is 27 feet and the maximum storage capacity is 295 acre-feet. Therefore, Moe Pond Dam is classified as a "Small" dam as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

There are seven roads (including New York State Routes 28 and 28/80), a railroad, numerous dwellings and buildings (Cooperstown) as well as historic Doubleday Field within the dam failure flood hazard area. Therefore, the dam is in the "High" hazard category as defined by the Recom-

mended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the State University of New York (SUNY) at Oneonta. The address and telephone number are as follows:

Owner

Contact: Dr. Williard N. Harman  
Biology Department  
State University College  
Oneonta, New York 13820

Telephone: (607) 431-3703

f. Purpose

The primary purpose of this dam is the creation of an impoundment for the study of wildlife habitat.

g. Design and Construction History

The dam was designed by Wm. Carter Burnett in October, 1934 and constructed by the Leatherstocking Corporation of Cooperstown, New York in the mid 1930's.

h. Normal Operating Procedure

There are no regular operating procedures for this dam. The normal water level in the reservoir is maintained by the crest elevation of the spillway at approximately 1630.0 (NGVD).

1.3 PERTINENT DATA

a. <u>Drainage Area (Square Miles)</u>	0.26
b. <u>Discharge at Dam Site (CFS)</u>	
- Top of Dam	178
- Crest of Spillway	-
- Reservoir Drain Inlet	-
c. <u>Elevations (NGVD - estimated)</u>	
- Top of Dam	1632.5
- Crest of Spillway	1630.0
- Reservoir Drain Inlet	-

d. Reservoir Surface Area (Acres)

- Top of Dam	39
- Crest of Spillway	37
- Reservoir Drain Inlet	-

e. Storage (Acre-Feet)

- Top of Dam	295
- Crest of Spillway	200
- Reservoir Drain Inlet	-

f. Dam

- Type: Earthfill with a concrete core and intermediate berm	
- Length (Feet)	222
- Upstream Slope (H:V)	-
above reservoir	0.5-2.0:1
below reservoir	less than 2:1
- Downstream Slope (H:V)	2:1
- Crest Width (Feet)	12±

g. Spillway

- Type: Stepped concrete weir and earthen discharge channel	
- Length (Feet)	15
- Width (Feet)	5±
- Side Slopes (H:V)	vertical
- Channel Bottom Slope (Feet/Foot)	-
- Control: None	

h. Reservoir Drain

- Type: 18 inch diameter cast iron pipe (62 feet long)	
- Control: 18 inch diameter slide gate located at centerline of dam	

## SECTION 2 - ENGINEERING DATA

### 2.1 GEOTECHNICAL DATA

#### a. Geology

Moe Pond Dam is located on Willow Brook, a southeasterly flowing tributary to Otsego Lake which is the headwaters of the Susquehanna River. It is about 1.3 miles northwest of the Village of Cooperstown and lies in the Allegheny Plateau physiographic province of New York State. Local topography ranges from elevation 1600 in the streambed below the dam to elevation 1820 atop the hill directly east of Moe Pond.

Bedrock in the vicinity of the site consists of the Panther Mountain Formation belonging to Middle Devonian Hamilton group. This formation consists of medium to fine-bedded, medium to coarse-grained silty shales, siltstones and sandstones. Cross bedding, ripple marks and other high current sedimentary structures are abundant. This unit was probably deposited in a near-shore delta platform setting within the Catskill Delta Complex which prograded across the state from east to west.

Above the bedrock, some or all of the valley bottom may be mantled with glacial till, a heterogeneous mixture of clay, silt, sand, gravel and cobbles, deposited at the base of ice sheets which once covered the region. This in turn may be overlain by well-sorted sands and gravels deposited by glacial meltwater or subsidiary tributary streams.

#### b. Subsurface Conditions

There are no known records of subsurface explorations at the site of Moe Pond Dam.

### 2.2 DESIGN RECORDS

Moe Pond Dam was designed by Wm. Carter Burnett in October, 1934; however, no records were obtained concerning the original design of the dam.

### 2.3 CONSTRUCTION RECORDS

This dam was constructed in the mid 1930's by the Leatherstocking Corporation. A plan, profile and section of the dam dated October, 1934 and obtained from the Leatherstocking Corporation are included in Appendix G; however, no other construction records were available.

#### 2.4 OPERATION RECORDS

No operation records were obtained for this dam.

#### 2.5 EVALUATION OF DATA

The data presented herein was obtained primarily from the files of the New York State Department of Environmental Conservation (DEC) and from the Leatherstocking Corporation in Cooperstown, New York. This information appears to be reliable and adequate for the purposes of a Phase I Inspection Report.

## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS

#### a. General

A visual inspection of Moe Pond Dam was conducted on April 9, 1981. The weather was mostly overcast and the temperature was 60+°F. At the time of the inspection, there was water flowing over the spillway weir (See Photo No. 10).

#### b. Dam

The earthfill embankment of the dam is generally in poor condition (See Photos No. 3, 4, 5, 6 and 7). Although somewhat obscured by heavy vegetative growth, there was no visible evidence of major lateral movement or settlement of the embankments. However, a significant depression was noted on the downstream side of the crest and active seepage was observed near the downstream toe.

The following specific items were noted:

1. A zone of active seepage was observed at the downstream toe to the right of the concrete endwall for the outlet works (See Photos No. 14 and 15). The flow rate was estimated at 1+ gallons per minute (GPM) and the seepage appeared to be clear.
2. A depression was noted in the crest, downstream of the embankment centerline, midway between the gate structure and the spillway (See Photo No. 17). The depression is concave downstream. It measures about 13 feet along the downstream edge of the crest and cuts into the crest to form an arc that projects as much as 6 feet. The vertical displacement of this area ranges from 1 to 2 feet along the downstream edge of the crest to zero feet at the perimeter of the arc that projects into the crest. The cause of this depression is unknown, but it may have been due to erosion, sloughing or maintenance operations associated with cleanup of uprooted trees or other activities.
3. The crest of the dam (See Photo No. 3) contained several irregular depressions ranging up to 1 to 2 feet in diameter and about 6 to 12 inches deep. The upstream embankment slope above the reservoir level has experienced sloughing and erosion due to wave action such that they have a nearly vertical slope over most of the embankment length (See Photos No. 4 and 6).



4. There are no abutment or retaining walls between the spillway and the embankment (See Photo No. 10). The embankment narrows to a crest width of about 2 feet at the location of the spillway and drops to a depth of 6 inches below the top of the concrete spillway end sections (which in turn are about 12 inches below the embankment crest).
5. The slopes and crest of the embankment had a heavy cover of brush and trees ranging up to 18+ inches in diameter (See Photos No. 3, 4, 5, 6, and 7). Trees were overhanging the upstream slope above the rock riprap and one had been uprooted (See Photo No. 6). One other uprooted tree was noted in the downstream slope area.
6. A significant accumulation of logs and other debris was observed on and immediately upstream and downstream of the spillway (See Photos No. 10 and 11).
7. Woodchuck and other animal burrows were observed in the downstream slope (See Photo No. 16).
8. No flow was evident from the 18 inch diameter cast iron outlet pipe even though the bottom two-thirds of the pipe was below the water level in the discharge channel (See Photo No. 9). The pipe was also "silted-up" to approximately one half its diameter.

c. Spillway

1. Spillway Weir

This broad-crested concrete weir is located at the left central portion of the embankment, and is 15 feet wide. The weir was in a state of disrepair in that the concrete has been allowed to deteriorate over the years, debris has collected at its entrance (See Photo No. 10) and a logjam has formed a short distance downstream (See Photos No. 10 and 11).

2. Spillway Discharge Channel

The 7+ foot wide discharge channel is excavated into earth and discharges into the main discharge channel approximately 150 feet downstream of the spillway weir (See Photo No. 12). The channel has no erosion protection for either its bottom or its side slopes. Consequently, erosion is prevailing throughout (See Photos No. 11 and 12).

d. Reservoir Drain

1. Reservoir Drain and Outlet Works

The 18 inch diameter cast iron pipe has a submerged inlet, is controlled by a slide gate and valves (See Photo No. 8) and has a reinforced concrete endwall. The reservoir drain was in poor condition; the concrete endwall was severely deteriorated and the outlet pipe was nearly completely "silted-up" (See Photo No. 9). The reservoir drain was not operated during the inspection and it appeared it had not been operated in quite some time.

2. Main Discharge Channel

The earthen discharge channel has a bottom width of 10 feet, a length of approximately 150 feet and is heavily overgrown (See Photo No. 13).

e. Downstream Channel

The natural channel downstream of the dam has a width of 10+ feet, a depth of 6 inches, and is in fair condition, being heavily overgrown. The channel is alluvial and its streambed consists of various gradations of gravel.

f. Reservoir - Storage Pool Area

The reservoir area is bordered by moderately sloping woodlands (See Photo No. 2). There is no significant probability of landslides into the storage pool affecting the safety of the dam. Sedimentation is not considered to be a factor in the the safety of this dam.

3.2 EVALUATION OF OBSERVATIONS

Visual inspection revealed a number of deficiencies on this structure. The following items were noted:

- a. Active seepage was observed at the downstream toe of slope.
- b. A large depression was observed in the crest between the gate structure and the spillway.
- c. The crest of the dam has several irregular depressions and the upstream embankment slope has sloughed and eroded from wave action.
- d. There are no abutment or retaining walls between the spillway and embankment.

- e. The slopes and crest of the embankment had a heavy cover of brush and trees.
- f. A significant accumulation of logs and other debris was noted in proximity to the spillway.
- g. The spillway discharge channel has experienced moderate erosion.
- h. The concrete of the spillway weir and outlet works has deteriorated.
- i. The reservoir drain is severely "silted-up".
- j. The main discharge channel is heavily overgrown.
- k. Woodchuck and other animal burrows were evident in the downstream slope.

## SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

### 4.1 PROCEDURES

The normal water surface level is maintained by the crest of the spillway weir at approximately elevation 1630.0 (NGVD). No operational procedures are in effect at this time.

### 4.2 MAINTENANCE OF DAM

It appears that the only maintenance procedures in effect include mowing and brush cutting of the embankment crest, as well as the removal of uprooted trees.

### 4.3 WARNING SYSTEM

No warning system is presently in effect.

### 4.4 EVALUATION

Presently, no operation and only a few maintenance procedures are in effect for this dam. Therefore, a program for regular maintenance should be developed and implemented.

## SECTION 5 - HYDROLOGIC/HYDRAULIC

### 5.1 DRAINAGE AREA CHARACTERISTICS

The dam is located in the Town of Otsego on Willow Brook, approximately 11,000 feet upstream of Otsego Lake in Coopers-town, New York, which is the headwaters of the Susquehanna River.

The watershed (shown on the Watershed Map on Page C-5 in Appendix C) consists of 168 acres (0.26 square miles) of hilly uplands with typical slopes of 10 percent. Land within the watershed is primarily undeveloped with extensive woodlands. There are no significant waterbodies or wetlands upstream from the dam.

The watercourse upon which the reservoir is located, is a small perennial stream with a typical flow width of 10 feet and a typical flow depth of 6 inches.

### 5.2 ANALYSIS CRITERIA

The purpose of the hydrologic/hydraulic analysis is to evaluate the spillway capacity and the potential for overtopping. The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers' HEC-1 Computer Model - Dam Safety Version. The procedure included determining the Probable Maximum Flood (PMF) runoff from the watershed and routing the inflow hydrograph through the impoundment to determine the outflow hydrograph. The unit hydrograph was defined by the Snyder Synthetic Unit Hydrograph method, and the Modified Puls routing procedure was incorporated.

The initial rainfall loss was assumed to be 1.0 inches, and the uniform rainfall loss was assumed to be 0.1 inches per hour. In accordance with recommended guidelines of the Corps of Engineers, the Probable Maximum Precipitation (PMP) was 19.3 inches (24 hour duration, 200 square mile area).

The analysis was conducted for both the full PMF and for several fractional PMF conditions. The PMF inflow of 660 CFS was routed through the reservoir and the peak outflow was determined to be 503 CFS.

### 5.3 SPILLWAY CAPACITY

The total outlet capacity is the discharge from the spillway. The spillway consists of a 15 foot long broad-crested concrete weir with 2.5 feet of allowable elevation head and an earthen discharge channel.

The stage discharge data for the spillway was calculated for the stages tabulated below:

<u>Stage (Feet)</u>	<u>Discharge Capacity (CFS)</u>	<u>Element of Structure</u>
1630.0	0	Spillway Crest
1630.5	16	--
1631.0	45	--
1631.5	83	--
1632.0	127	--
1632.5	178	Top of Dam

The total spillway capacity at the top of dam is 178 CFS.

#### 5.4 RESERVOIR CAPACITY

The storage capacity of the reservoir was calculated for the stages indicated below:

<u>Stage (Feet)</u>	<u>Storage (Acre-Feet)</u>	<u>Storage (Inches of Runoff)</u>
1630.0	200	14.29
1632.5	295	21.07

#### 5.5 FLOODS OF RECORD

No data regarding flood levels was obtained for this dam.

#### 5.6 OVERTOPPING POTENTIAL

The results of the HEC-1 DB computer analysis indicate that the crest of the dam is overtopped by all storms exceeding 62 percent of the PMF event. The PMF discharge rate of 503 cubic feet per second (CFS) would occur at a peak flood stage of 1633.1 feet, which is 0.6 feet above the crest of the dam.

The results of the analysis are tabulated below:

<u>Flood Condition</u>	<u>Peak Inflow (CFS)</u>	<u>Peak Outflow (CFS)</u>	<u>Maximum Stage Elevation (NGVD)</u>
0.5 PMF	330	135	1632.1
1.0 PMF	660	503	1633.1

## 5.7 EVALUATION

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the capacity of the spillway is not adequate to pass the full PMF, but it will pass one half the PMF; approximately 62 percent of the PMF can be safely passed before overtopping will occur. The PMF event would overtop the dam for a duration of 4 hours and the maximum depth of flow over the crest would be 0.6 feet. Therefore, the spillway is adjudged to be inadequate.

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observations

There was no visible evidence of major settlement, lateral movement or overall structural instability of the dam during the site examination. Based on the conditions that were observed, there is no reason to question the static structural stability of the dam; however, both the active seepage and the continued erosion or sloughing of the upstream and downstream slopes near the crest represent a potential hazard to the overall integrity of the dam.

#### b. Design and Construction Data

There is no construction data to confirm the nature and actual physical properties of the earthfill in the embankment. However, the dam proportions are considered to be reasonable for the soils that were available at the site and therefore, the dam would be expected to have an adequate safety margin with respect to overall stability under static loading conditions.

#### c. Operating Records

No operating records were obtained for Moe Pond Dam.

#### d. Post Construction Changes

The 1934 drawings for Moe Pond Dam in Appendix G show a configuration for the dam and spillway that generally corresponds to the conditions observed during the visual examination of April 9, 1981, except for the following:

1. The observed embankment crest width was approximately 12 feet, whereas the crest width shown on the plans was 6 feet.
2. A berm has apparently been constructed on the downstream slope; this berm does not appear on the 1934 drawings.
3. The spillway shown on the drawings had a stepped concrete discharge apron; however, no such apron was constructed.
4. The reservoir drain which was noted during the inspection was an 18 inch diameter cast iron pipe; whereas, the plans showed a 3 foot square concrete box conduit.



## 6.2 STRUCTURAL STABILITY ANALYSIS

Available drawings show the concrete core wall and dimensions. As part of the present study, stability computations have been performed. Without the passive resistance of the material downstream of the spillway, the stability of the core wall section at the spillway would be unacceptable.

The stability analysis is presented in Appendix E. The results of the stability computations are summarized in the following table:

<u>Loading Condition (Spillway Section)</u>	<sup>1</sup> Factors of Safety		<sup>3</sup> Location of Resultant Passing Through Base
	<u>Over- turning</u>	<sup>2</sup> <u>Sliding</u>	
1. Normal operating condition: water level at 1 foot above spillway crest	2.55	4.48	N/A
2. Maximum operating condition: water level at top of dam (2.5 feet above spillway crest)	2.25	4.03	N/A
3. Full PMF condition: water level at El. 1633.0 (3.0 feet above spillway crest)	2.17	3.92	N/A
4. Ice loading condition: 5.0 Kips per foot acting at top of spillway	1.59	3.44	N/A

<sup>1</sup>These factors of safety indicate the ratio of moments resisting overturning to those moments causing overturning, and the ratio of forces resisting sliding to those causing sliding.

<sup>2</sup>As determined applying the friction-shear method

<sup>3</sup>Since stability of the cross section depends on passive soil pressure, this ratio is not meaningful.

The analysis indicates that with the consolidated material downstream of the spillway in place, the factors of safety for overturning were acceptable for all cases of loading except the ice loading condition.

Since the passive soil pressure is much greater than the active loadings, all factors of safety for sliding were within acceptable limits.

This analysis applies to a concrete core wall which is continuous across the spillway. It also assumes consolidated material providing passive resistance to movement; should this downstream material erode or be removed by excavation, static instability could result.

Moe Pond Dam is located in Seismic Zone 2, and in accordance with recommended Phase I guidelines does not require separate seismic analysis.

## SECTION 7 - ASSESSMENT/RECOMMENDATIONS

### 7.1 ASSESSMENT

#### a. Condition

On the basis of the visual examination, there were no signs of impending structural failure or other conditions which would warrant urgent remedial action; however, a number of serious deficiencies were noted.

#### b. Adequacy of Information

Since there were no drawings available, the evaluation of this dam is based primarily on visual examination, limited measurements at the site, approximate hydraulic and hydrologic computations, and application of engineering judgement. The available information that was obtained is adequate for the purposes of a Phase I assessment.

#### c. Need for Additional Investigations

It is recommended that the following additional investigations be performed by a registered professional engineer engaged by the owner:

1. The present embankment sections adjacent to the spillway represent a potential hazard to the dam with respect to possible erosion, piping and/or failure of the dam during high reservoir levels. Therefore, regrade this area to make the embankment section conform to the embankment cross sections elsewhere. In addition, adequately protect these sections from spillway outflows.
2. Investigate the seepage that was observed near the downstream toe of slope, including observation during high and low reservoir levels, evaluate the cause and recommend appropriate remedial measures.

#### d. Urgency

It is recommended that within 3 months of the final approval date of this report, all of the additional investigations should be initiated and within 18 months, appropriate remedial measures should be completed. The corrective measures listed in Section 7.2 should be accomplished within 12 months of final approval.

## 7.2 RECOMMENDED MEASURES

It is considered important that the following items be accomplished in addition to any items required as a result of the additional investigations recommended in Section 7.1c:

- a. Fill and regrade the major depression between the drop structure and the spillway, as well as the other local depressions along the embankment crest and downstream slope to restore a uniform embankment cross section. Re-establish vegetative cover in these areas.
- b. Clear the brush and trees from the embankment, including stump removal and backfilling, establish a vegetative cover, and cut grass and weeds on the embankment at least annually.
- c. Flatten the grade at the top of the upstream slope and provide riprap or alternate slope protection as required between the crest and the existing riprap to prevent future slumping and erosion due to wave action.
- d. Ensure the reservoir drain and its controls are operational.
- e. Repair the deteriorated concrete of the spillway and outlet works endwall.
- f. Fill in the woodchuck burrow and any other burrows noted in the embankment slopes.
- g. Remove all logs, debris and other obstructions from the spillway area.
- h. Develop and implement a flood warning and emergency evacuation plan which would be implemented to alert the downstream residents in the event conditions occur which could result in the failure of the dam.
- i. A program for regular maintenance should be developed and implemented.

APPENDIX A  
PHOTOGRAPHS

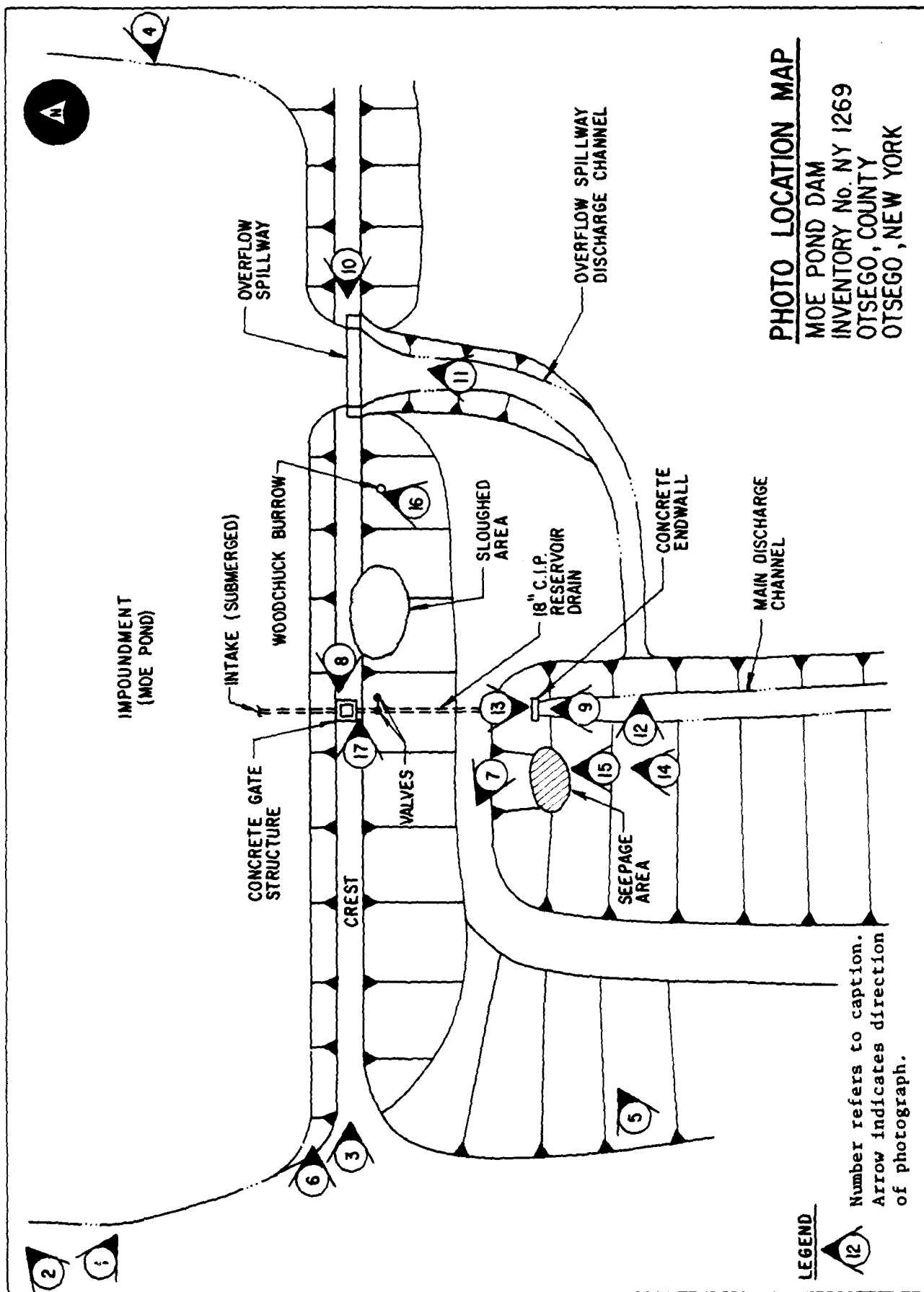




PHOTO #2: Overview of impoundment



PHOTO #3: Crest of dam looking toward  
left abutment



PHOTO #4: Overview of upstream face of dam



PHOTO #5: Overview of downstream face of dam





PHOTO #6: Upstream face of dam



PHOTO #7: Downstream face of dam



PHOTO #8: Gate structure and valves



PHOTO #9: Outlet works



PHOTO #10: Crest of spillway



PHOTO #11: Spillway discharge channel looking upstream



PHOTO #12: Spillway discharge channel exit into main discharge channel



PHOTO #13: Downstream channel conditions



PHOTO #14: Seepage located to the right of outlet works



PHOTO #15: Close-up of seepage



PHOTO #16: Woodchuck burrow on downstream slope



PHOTO #17: Depression in downstream slope  
between gate structure and  
spillway

APPENDIX B  
VISUAL INSPECTION CHECKLIST

## VISUAL INSPECTION CHECKLIST

### 1) Basic Data

#### a. General

Name of Dam Moe Pond Dam  
Fed. I.D. # NY 1269 DEC Dam No. ---  
River Basin Susquehanna  
Location: Town Otsego County Otsego  
Stream Name Willow Brook  
Tributary of Otsego Lake (Susquehanna River)  
Latitude (N) 42° - 42.8' Longitude (W) 74° - 56.7'  
Type of Dam Earthfill embankment with a concrete overflow spillway  
Hazard Category High  
Date(s) of Inspection April 9, 1981  
Weather Conditions Overcast, 60° ± F.  
Reservoir Level at Time of Inspection Elevation 1630.1 ± (NGVD)

b. Inspection Personnel T. L. Ward & R. A. Criscuolo of Flaherty Giavara Associates  
P. C.; J. J. Rixner of Haley & Aldrich, Inc.; B. McL. Whittingham of Salmon  
Associates.

c. Persons Contacted (Including Address & Phone No.)  
Dr. Williard N. Harman John Hohenfeldt, Building Manager  
Biology Department Biological Field Station  
State University College State University College  
Oneonta, New York 13820 Cooperstown, New York 13326  
(607) 431-3703 (607) 547-8778

#### d. History:

Date Constructed Mid 1930's Date(s) Reconstructed \_\_\_\_\_  
Designer Wm. Carter Burnett  
Constructed By Leatherstocking Corporation  
Owner State University of New York (SUNY) at Oneonta



2) Embankment

a. Characteristics

- (1) Embankment Material Unknown
- (2) Cutoff Type Core wall
- (3) Impervious Core Concrete core wall
- (4) Internal Drainage System None observed
- (5) Miscellaneous No comments

b. Crest

- (1) Vertical Alignment Fair; surface generally irregular; rutting in footpath; surface erosion and 12+ foot wide depression between gate structure and spillway
- (2) Horizontal Alignment Good; substantially straight
- (3) Surface Cracks None observed except at uprooted tree
- (4) Miscellaneous Surface irregular, depressions up to approximately 1.0 foot deep; grass, brush, small trees and footpath

c. Upstream Slope

- (1) Slope (Estimate - V:H) 1:3
- (2) Undesirable Growth or Debris, Animal Burrows Numerous trees and shrubs; uprooted tree adjacent to right abutment; no animal burrows were noted
- (3) Sloughing, Subsidence or Depressions Some surface erosion noted; shallow surface sloughing observed, apparently from wave action

(4) Slope Protection Blocky to flat riprap noted in reservoir

(5) Surface Cracks or Movement at Toe None evident

d. Downstream Slope

(1) Slope (Estimate - V:H) 1:2.5

(2) Undesirable Growth or Debris, Animal Burrows Brush, grass and trees 18 to 24 inches in diameter; numerous woodchuck burrows

(3) Sloughing, Subsidence or Depressions Surface generally irregular; surface erosion and 12+ foot wide depression between gate structure and spillway

(4) Surface Cracks or Movement at Toe None apparent; however, slope is very irregular

(5) Seepage Wet area observed to the right of outlet works at approximately the same elevation

(6) External Drainage System (Ditches, Trenches, Blanket) None apparent

(7) Condition Around Outlet Structure Reinforced concrete endwall was severely deteriorated; outlet pipe was almost completely "silted-in"

(8) Seepage Beyond Toe None evident

e. Abutments - Embankment Contact

Left: Good condition

Right: Good condition

(1) Erosion at Contact None observed

(2) Seepage Along Contact None evident

3) Drainage System

a. Description of System Broad-crested concrete weir and earthen discharge channel leading to the main discharge channel

b. Condition of System Poor; concrete of the spillway weir is deteriorated; debris has collected at the spillway entrance; a logjam has formed just downstream from the spillway weir

c. Discharge from Drainage System Earthen discharge channel leading to main discharge channel

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Peizometers, Etc.)

None observed

5) Reservoir

- a. Slopes Moderately sloping woodlands
- b. Sedimentation None observed
- c. Unusual Conditions Which Affect Dam None noted

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) Numerous dwellings and buildings (Cooperstown), historic Doubleday Field, a railroad and seven roads (including New York State Routes 28 and 80) are within the dam failure flood hazard area
- b. Seepage, Unusual Growth None observed
- c. Evidence of Movement Beyond Toe of Dam None evident
- d. Condition of Downstream Channel Fair; channel is unprotected against erosion and heavily overgrown

7) Spillway(s) (Including Discharge Conveyance Channel)

Spillway and discharge channel

- a. General Spillway and discharge channel handle all flows
- b. Condition of Overflow Spillway Poor; concrete is deteriorated; debris has collected at the entrance to the spillway; a logjam has formed just downstream of the spillway

c. Condition of Emergency Spillway Not applicable

d. Condition of Discharge Conveyance Channel Fair condition; heavily overgrown  
and no erosion protection

8) Reservoir Drain/Outlet

Type: Pipe X Conduit \_\_\_\_\_ Other \_\_\_\_\_

Material: Concrete \_\_\_\_\_ Metal Cast iron Other \_\_\_\_\_

Size: 18 inch Length 62 feet

Invert Elevations: Entrance Unknown (submerged) Exit Unknown (silted)

Physical Condition (Describe): Unobservable

Material: Unknown

Joints: Unknown Alignment Unknown

Structural Integrity: Appears to be good

Hydraulic Capability: Poor; pipe is severely silted

Means of Control: Gate Slide gate Valve \_\_\_\_\_ Uncontrolled \_\_\_\_\_

Operation: Operable \_\_\_\_\_ Inoperable \_\_\_\_\_ Uncontrolled \_\_\_\_\_

Present Condition (Describe): Unknown, slide gate was not operated during  
the inspection

9) Structural

- a. Concrete Surfaces Concrete of the spillway crest and of the endwall has  
spalled and exposed some reinforcing; concrete of the gate structure  
is in good condition
- b. Structural Cracking No evidence of any structural cracks
- c. Movement - Horizontal & Vertical Alignment (Settlement) None observed
- d. Junctions with Abutments or Embankments Fair; however, there are no spillway  
retaining walls
- e. Drains - Foundation, Joint, Face None evident
- f. Water Passages, Conduits, Sluices Poor condition; endwall is severely  
deteriorated, pipe is badly silted and spillway is clogged with debris
- g. Seepage or Leakage No signs of seepage or leakage

- h. Joints - Construction, etc. Good condition
- i. Foundation Inaccessible
- j. Abutments See 9) d. above
- k. Control Gates 18 inch diameter slide gate controls the reservoir drain
- l. Approach & Outlet Channels Not applicable
- m. Energy Dissipators (Plunge Pool, etc.) None evident
- n. Intake Structures Unknown
- o. Stability Appears to be stable
- p. Miscellaneous No comments

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

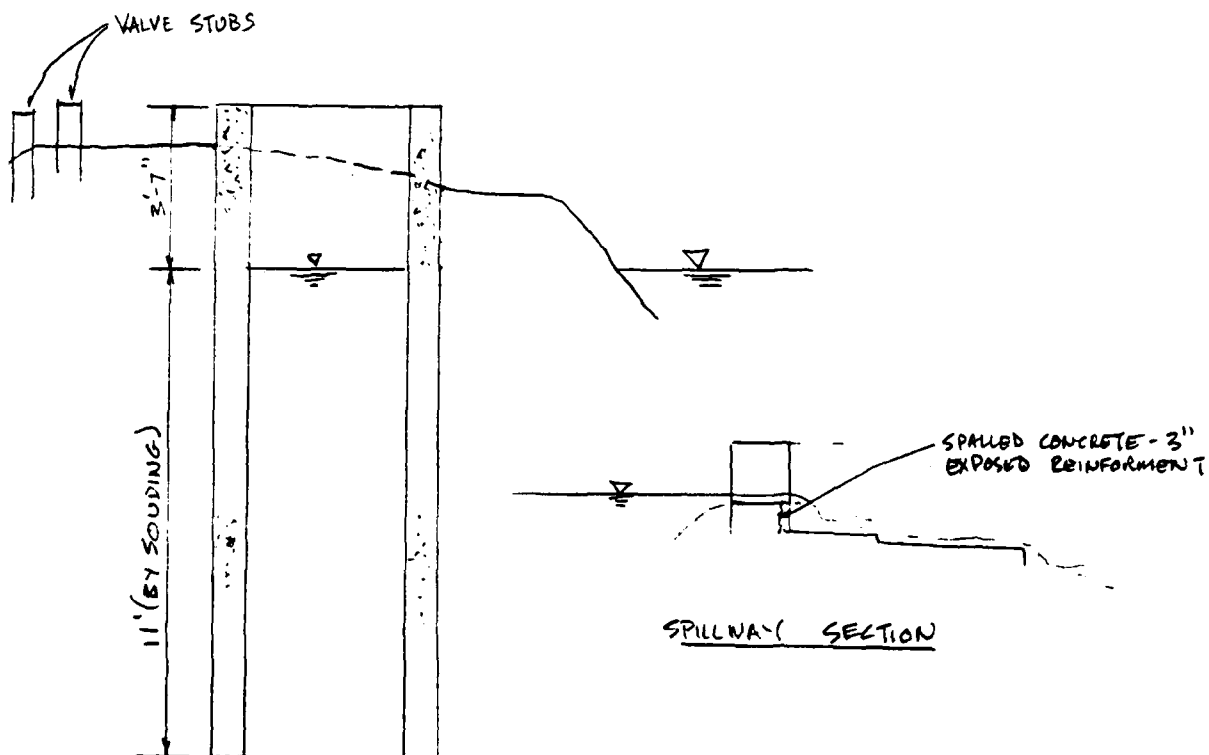
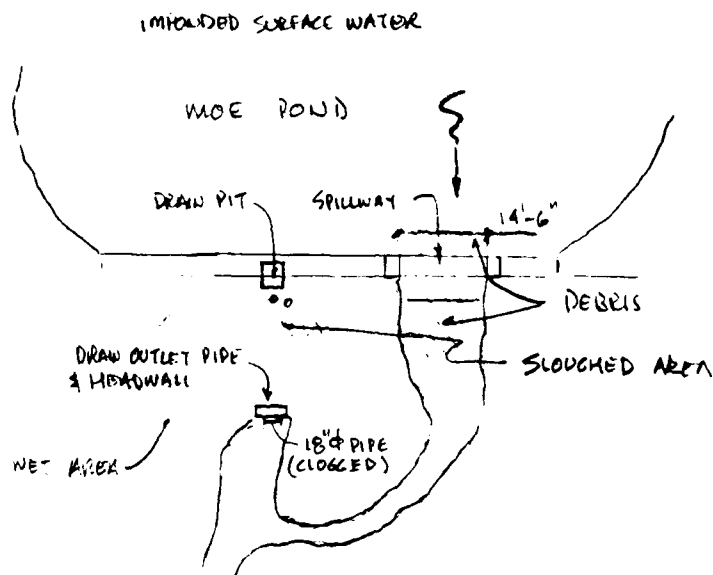
a. Description and Condition None observed

This image shows a single sheet of white paper with horizontal blue or grey ruling lines, typical of notebook paper. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.



# SALMON ASSOCIATES • Consulting Engineers

BY FW DATE \_\_\_\_\_ SUBJECT MOE POND DRAIN - OTSEGO CO. SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_  
 CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_ FED. I.D. # 1265 JOB NO. 8041  
 \_\_\_\_\_ N.Y. \_\_\_\_\_



DRAIN PIT SECTION

APPENDIX C .

HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam	<u>1632.5</u>	<u>39</u>	<u>295</u>
2) Design High Water (Max. Design Pool)	<u>--</u>	<u>--</u>	<u>--</u>
3) Emergency Spillway Crest	<u>--</u>	<u>--</u>	<u>--</u>
4) Pool Level with Flashboards	<u>--</u>	<u>--</u>	<u>--</u>
5) Principal Spillway Crest	<u>1630.0</u>	<u>37</u>	<u>200</u>

DISCHARGES:

	<u>Volume</u> (cfs)
1) Average Daily	<u>Unknown</u>
2) Overflow Spillway @ Maximum High Water (Top of Dam)	<u>178</u>
3) Emergency Spillway @ Design High Water	<u>--</u>
4) Principal Spillway @ Emergency Spillway Crest	<u>--</u>
5) Low Level Outlet @ Principal Spillway Crest	<u>32</u>
6) Total (of all facilities) @ Maximum High Water	<u>210</u>
7) Maximum Known Flood	<u>Unknown</u>
8) At Time of Inspection	<u>1 +</u>

CREST:

ELEVATION: 1632.5 (NGVD)

Type Earthen embankment with a concrete core wall

Width 12+ feet

Length 222 feet

Spillover Concrete overflow spillway weir

Location Left center section of embankment

SPILLWAY:

PRINCIPAL

EMERGENCY

1630.0 (NGVD)	Elevation	
Broad-crested weir	Type	
5+ feet	Width	
	<u>Type of Control</u>	
Weir	Uncontrolled	
--	Controlled	
None	Type:	
	(Flashboards; gate)	
One	Number	
15 foot weir	Size/Length	
Concrete	Invert Material	
Continuously	Anticipated Length of Operating Service	
Unknown	Chute Length	
Unknown	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	

Type: \_\_\_\_\_

Location: \_\_\_\_\_

Records:

Date      Unknown

Max. Reading      Unknown

FLOOD WATER CONTROL SYSTEM:

Warning System      None in effect

Method of Controlled Releases (mechanisms) Manually controlled slide gate to  
drain the impoundment

DRAINAGE AREA: 168 acres = 0.26 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type Rural, wildlife preserve for conservation and study

Terrain - Relief Rolling uplands

Surface - Soil Glacial till

Runoff Potential (existing or planned extensive alterations to existing surface or subsurface conditions)

Primarily woodlands with scattered open fields; glacial till soils;

average watershed slope is 10 ± percent

Potential Sedimentation problem areas (natural or man-made; present or future)

None

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

None

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the reservoir perimeter:

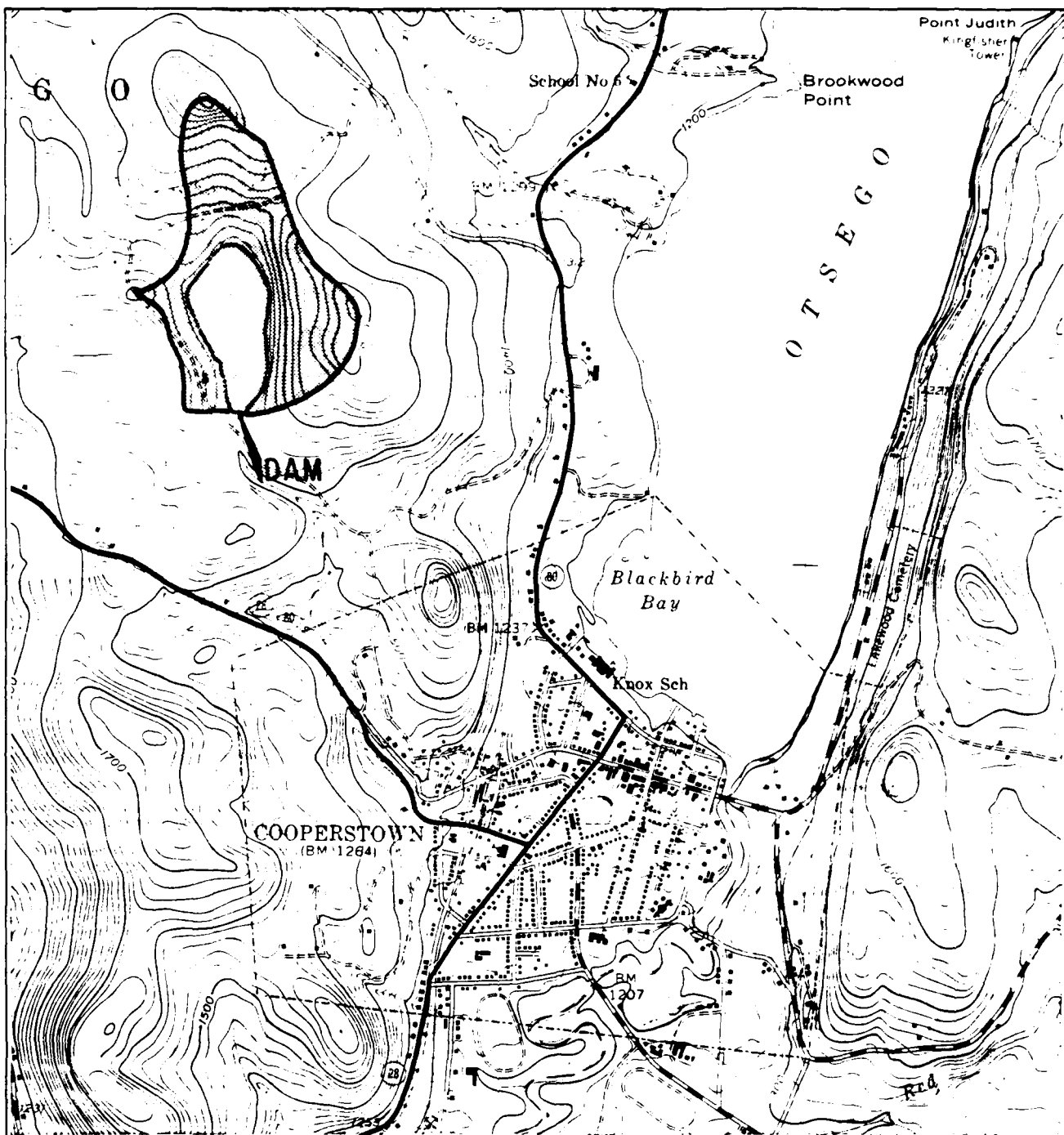
Location: None

Elevation: \_\_\_\_\_

Reservoir:

Length @ Maximum Pool 2,300 ± feet = 0.4 miles (Miles)

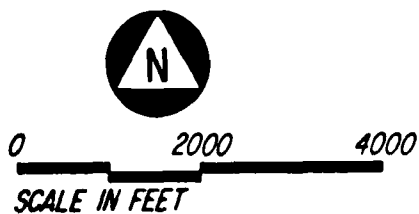
Length of Shoreline (@ Spillway Crest) 5,500 ± feet = 1.0 miles (Miles)



## WATERSHED MAP

MOE POND DAM  
INVENTORY No. NY 1269

SUSQUEHANNA RIVER BASIN  
OTSEGO COUNTY  
OTSEGO, NEW YORK



FLAHERTY • GIAVARA ASSOCIATES, P.C.

CALCULATIONS





## WATERSHED DATA FOR HEC I SNYDER HYDROGRAPH

### 1) TIME TO PEAK

$$L = 4400 \text{ ft} = 0.83 \text{ miles}$$

$$L_c = 1900 \text{ ft} = 0.36 \text{ miles}$$

$C_t = 2.0$  for average slopes

$$T_p = C_t (L L_c)^{0.3}$$
$$= 2.0 (0.83 \times 0.36)^{0.3} = 1.39 \text{ Hours}$$

$$t_r = \frac{T_p}{5.5} = \frac{1.39}{5.5} = 0.25 \quad \text{USE } t_r = 0.5$$

$$t_{pR} = t_p + 0.25(t_R - t_r)$$
$$= 1.39 + 0.25(0.5 - 0.25) = 1.45 \text{ Hours}$$

### 2) % IMPERVIOUS

$$1 \text{ HOUSE } @ \approx 1000 \text{ ft}^2$$

$$1000 \text{ ft}^2 = 0.02 \text{ AC}$$

$$\frac{0.02}{1680} = 0.01 \%$$

### 3) WATERSHED AREA

$$1680 \text{ acres} / 640 = 0.26 \text{ mi}^2$$

PROJECT CORPS DAMS  
NY 1269



**FLAHERTY-GIAVARA ASSOCIATES**  
ENVIRONMENTAL DESIGN CONSULTANTS  
ONE COLUMBUS PLAZA, NEW HAVEN, CONN. 06510/203/786-1280

SHEET NO. 2 OF 4  
BY RAC DATE 4-28-81  
CHK'D. BY TLW DATE 5-1-81

4) RAINFALL DATA (FROM HYDROMETEOROLOGICAL  
REPORT NO. 33).

24 Hour Duration PMD = 19.3 inches for  
300 square miles

<u>DURATION (HOURS)</u>	<u>Adj. Factor %</u>
6	111
12	122
24	133
48	143

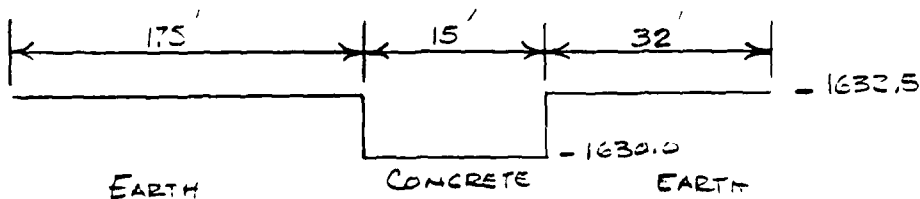
PROJECT 2000' DAM  
NY 235



**FLAHERTY-GIAVARA ASSOCIATES**  
 ENVIRONMENTAL DESIGN CONSULTANTS  
 ONE COLUMBUS PLAZA NEW HAVEN CONN 06510/203/789-1280

SHEET NO. 5 OF 5  
 BY RAC DATE 4-23-91  
 CHK'D. BY TLW DATE 5-1-91

## STAGE DISCHARGE DATA



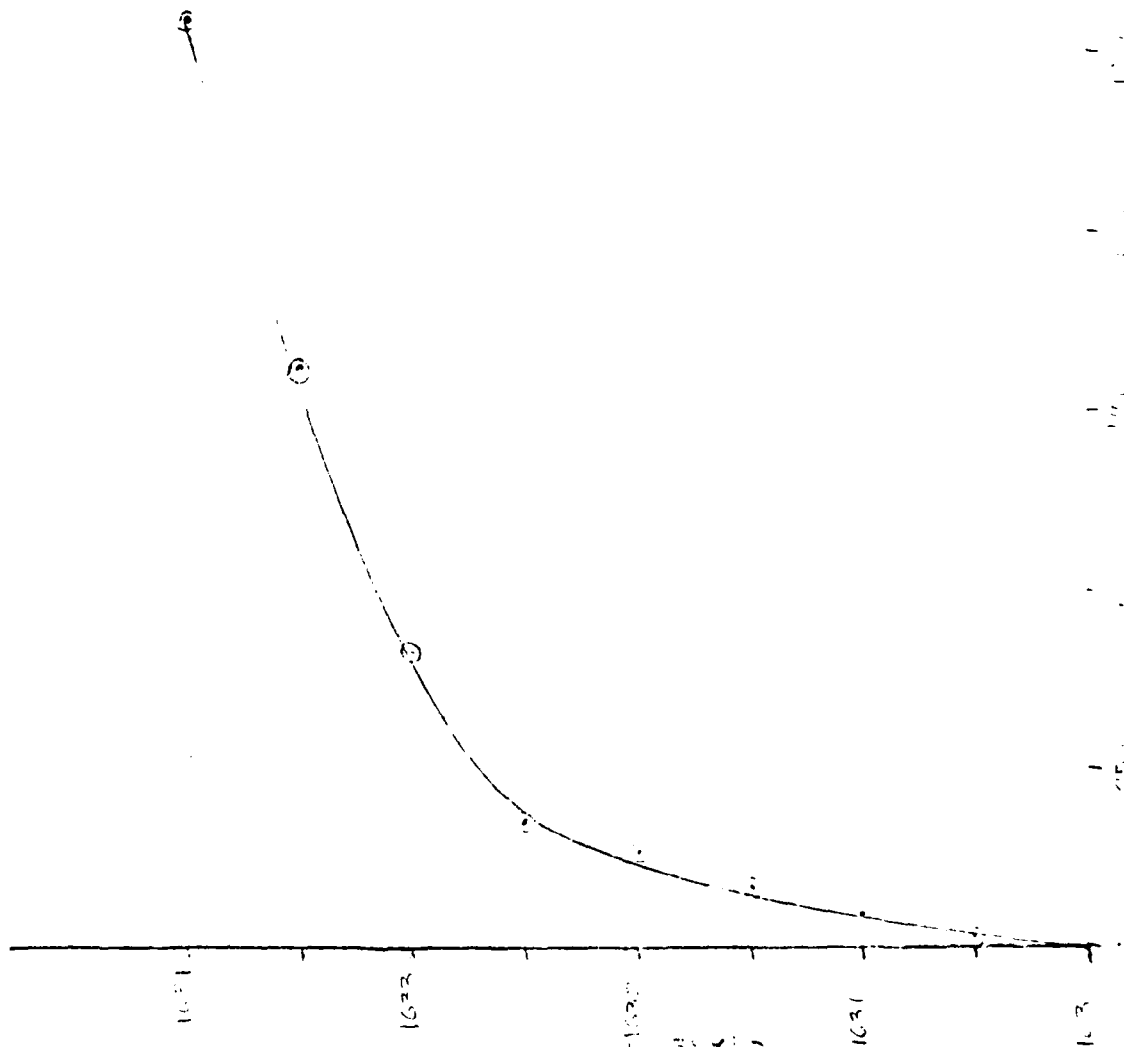
<u>STAGE</u>	<u><math>Q = 3(15)H^{1.5}</math></u>	<u><math>Q = 2.5(200)H^{1.5}</math></u>	<u>DISCHARGE</u>
1630.0	—	—	0
1630.5	$3(15)(.5)^{1.5}$	—	15.9
1631.0	$3(15)(1)^{1.5}$	—	45.0
1631.5	$3(15)(1.5)^{1.5}$	—	82.7
1632.0	$3(15)(2)^{1.5}$	—	157.3
1632.5	$3(15)(2.5)^{1.5}$	—	277.9
1633.0	$3(15)(3)^{1.5}$	$2.5(207)(.5)^{1.5}$	416.8
1633.5	$3(15)(3.5)^{1.5}$	$2.5(207)(1)^{1.5}$	812.2
1634.0	$3(15)(4)^{1.5}$	$2.5(207)(1.5)^{1.5}$	1310.7

PROJECT \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**FLAHERTY-GIAVARA ASSOCIATES**  
 ENVIRONMENTAL DESIGN CONSULTANTS  
 ONE COLUMBUS PLAZA NEW HAVEN CONN 06510/203-789-1200

SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_  
 BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CHK'D. BY \_\_\_\_\_ DATE \_\_\_\_\_



*Discard*

PROJECT South



**FLAHERTY-GIAVARA ASSOCIATES**  
ENVIRONMENTAL DESIGN CONSULTANTS  
ONE COLUMBUS PLAZA NEW HAVEN CONN 06510/203/789-1280

SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_  
BY \_\_\_\_\_ DATE \_\_\_\_\_  
CHK'D. BY TLW DATE 2-1-88

SPRINKLER SYSTEMS CHART

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HEC-1 FLOOD HYDROGRAPH COMPUTATIONS

FLAHERTY GIAVARA ASSOCIATES, P. C.

FLAHERTY GIAVARA ASSOCIATES, P. C.  
FLOOD HYDROGRAPH PACKAGE (HEC-1)  
DAM SAFETY VERSION JULY 1978  
LAST MODIFICATION 26 FEB 79

1 NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT  
2 DAM INVENTORY NO. 1269, MOE POND DAM, OTSEGO COUNTY, NEW YORK, APRIL 29, 1981  
3 PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P. C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT  
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Y5 15.9 45.0 82.7 127.3 177.9 233.8 294.7 360.0  
9A 36.7 45.9 55.1  
9E1630.0 1640.0 1650.0  
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9E1632.5  
K 99

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS  
RUNOFF HYDROGRAPH AT  
ROUTE HYDROGRAPH TO  
END OF NETWORK

\*\*\*\*\*  
FLOOD HYDROGRAPH PACKAGE (HEC-1)  
DAM SAFETY VERSION JULY 1978  
LAST MODIFICATION 26 FEB 79  
\*\*\*\*\*

RUN DATE: 7/02/  
TIME: 11:43 AM

NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT  
DAM INVENTORY NO. 1269, MOE POND DAM, OTSEGO COUNTY, NEW YORK, APRIL 29, 1981  
PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P. C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT

NG NWR NMIN IDAY JOB SPECIFICATION METRC IPLT IPRT NSTAN  
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MULTI-PLAN ANALYSES TO BE PERFORMED

RTI05=	0.50	0.33	0.60	0.61	0.62	0.63	0.64	0.65	1.00
NPLAN= 1 NRTI0= 9 LRTI0= 1									

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## SUB-AREA RUNOFF COMPUTATION

[illegible]

HYDQ	1	TAREA	0.26	SNAP	0.00	TRSDA	0.26	TRSPC	0.00	RATIO	0.000	ISNOW	0	ISAME	1	LOCAL	0
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## PRECIP DATA

R12	R24	R48	R72	R96
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TRSPC COMPUTED BY THE PROGRAM IS 0.500

LOSS DATA										
LRPT	STKR	DLTKR	RTIOL	ERAIN	STKR	RTICK	STRTL	CNSTL	ALSHX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA  
1.43 CP=0.63 NTA= 0

RECESSION DATA

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP	STRTO=-2.00	GRCSN=-0.10	RTIOR=1.90
AND TP ARE TC=3.97			AND R=2.28
			INTERVALS

UNIT HYDROGRAPH 14 END-OF-PERIOD ORDINATES; LAQ= 1.44 HOURS, CP= 0.63 VOL= 1.00

[illegible]



✱love✱

**FLAHERTY CIAVARA ASSOCIATES, P. C.**

0.1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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CONFIDENTIAL



9. 30115.  
10. 00116.  
10. 30117.  
11. 00118.  
11. 30119.  
12. 00120.

**\*DVI\***

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

TIME	RTIO 1
00000	1.00
00001	1.00
00002	1.00
00003	1.00
00004	1.00
00005	1.00
00006	1.00
00007	1.00
00008	1.00
00009	1.00
00010	1.00
00011	1.00
00012	1.00
00013	1.00
00014	1.00
00015	1.00
00016	1.00
00017	1.00
00018	1.00
00019	1.00
00020	1.00
00021	1.00
00022	1.00
00023	1.00
00024	1.00
00025	1.00
00026	1.00
00027	1.00
00028	1.00
00029	1.00
00030	1.00
00031	1.00
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00033	1.00
00034	1.00
00035	1.00
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00037	1.00
00038	1.00
00039	1.00
00040	1.00
00041	1.00
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00090	1.00
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00092	1.00
00093	1.00
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00095	1.00
00096	1.00
00097	1.00
00098	1.00
00099	1.00
00100	1.00

[illegible]

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

[illegible][illegible]



[illegible]

1 FOR PLAN 1, RTIO 9

# HYDROGRAPH AT STA

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C-19

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## HYDROGRAPH ROUTING

RESERVOIR	ROUTING -	MODIFIED PULS	METHOD	JPLT	JPRJ	INAME	ISTAGE	IAUTO
IBTAG	ICOMP	IRECON	ITAPE	O	O	I	O	O
GLOSS	CLOSS	Avg	ROUTING DATA	IDPT	IPMP	LSTR		
0.0	0.000	0.00	IRES ISAME I	O	O			
NSTPS	NSTDLL	LAG	AMSKK	X	TSK	STORA	ISPRAT	

		1	0	0	0.000	0.000	-1	
STAGE	1630.00	1630.50	1631.00	1631.50	1632.00	1632.50	1633.00	1634.00
FLOW	0.00	19.90	49.00	82.70	127.30	177.90	233.80	360.00
SURFACE AREA=	37.	46.	55.					
CAPACITY=	0	412.	916.					
ELEVATION=	1630.	1640.	1650.					
	CREL	SPWID	COGW	EXPH	ELEVL	COBL	CAREA	EXPL
	1630.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA			
TOPEL	COOD	EXPD	DAMWID
1632.5	2.5	1.5	207

STATION 1, PLAN 1, RATIO 1

# END-OF-PERIOD "HYDROGRAPH ORDINATES

[illegible]



1630 189397  
1630  
1631  
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1630 170397  
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1630 15 1 4 07  
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1630 141407  
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1630.	1
1630.	3
1632.	1
1631.	5
1631.	0
1630.	8

1630. 1  
1630. 2  
1632. 0  
1631. 5  
1631. 1  
1630. 8

1630. 0.28.61.8

1630.026718

1630.	0
1630.	1
1631.	3
1631.	7
1631.	2
1630.	9

1630.	0
1630.	1
1631.	1
1631.	8
1631.	2
1630.	9

PEAK OUTFLOW IS 135. AT TIME 43.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFB	135.	114.	60.	24.	1.	83.
CMS	4.	13.	2.	1.	1.	9.69
INCHES		4.10	8.54	8.69		220.79
MM		104.04	216.80	220.79		120.
CU-FT		118.	118.	149.		149.
THOUS. CU M		70.	146.	149.		149.

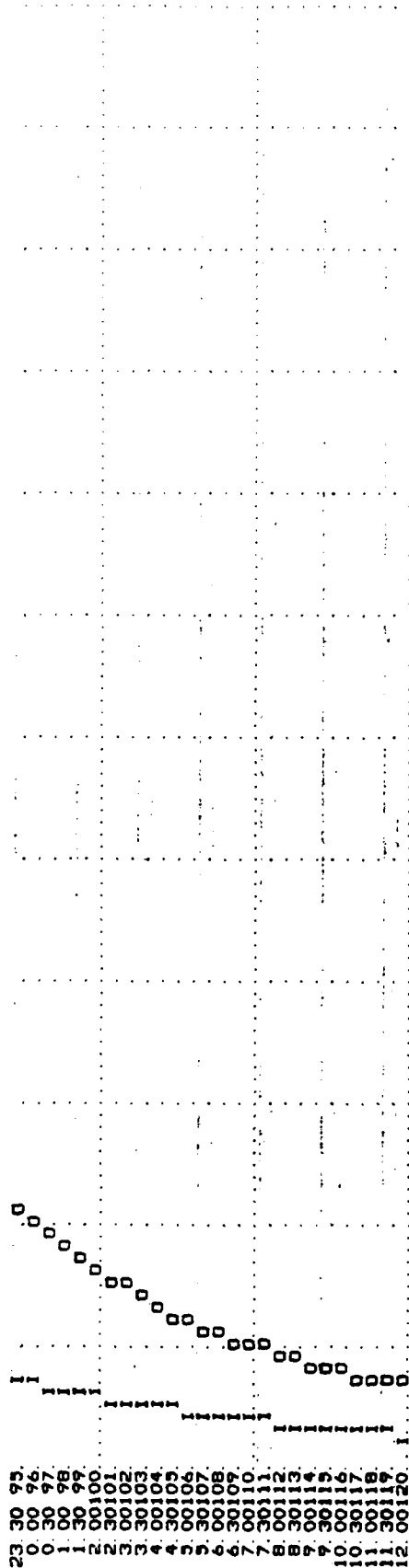
**\*OVF\***

STATION 1

	INFLOW(I),	OUTFLOW(O)	AND OBSERVED FLOW(*)	
0	40	80	120	160
			200	240
			280	320
			360	0
			0	0

C-21

18 30 3701  
19 00 3801  
20 30 3901  
21 00 4001  
22 30 4101  
23 00 4201  
24 30 4301  
25 00 4401  
26 30 4501  
27 00 4601  
28 30 4701  
29 00 4801  
30 30 4901  
31 00 5001  
32 30 5101  
33 00 5201  
34 30 5301  
35 00 5401  
36 30 5501  
37 00 5601  
38 30 5701  
39 00 5801  
40 30 5901  
41 00 6001  
42 30 6101  
43 00 6201  
44 30 6301  
45 00 6401  
46 30 6501  
47 00 6601  
48 30 6701  
49 00 6801  
50 30 6901  
51 00 7001  
52 30 7101  
53 00 7201  
54 30 7301  
55 00 7401  
56 30 7501  
57 00 7601  
58 30 7701  
59 00 7801  
60 30 7901  
61 00 8001  
62 30 8101  
63 00 8201  
64 30 8301  
65 00 8401  
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67 00 8601  
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71 00 9001  
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73 00 9201  
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81 00 0001  
82 30 0101  
83 00 0201  
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90 30 0901  
91 00 1001  
92 30 1101  
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96 30 1501  
97 00 1601  
98 30 1701  
99 00 1801  
00 30 1901



**◆ ◆ ◆ ◆ ◆**

STATION 1, PLAN 1, RATIO 2  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 153. AT TIME 43.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFB	153.	129.	66.	27.	1.	92.
CMS	4.	4.	2.	1.	1.	7.65
INCHES		4.60	9.48	7.65		245.18
MM		116.89	240.67	245.18		134.
AC-FT		64.	131.	134.		165
CU M		79.	162.	165.		165
THOUS						

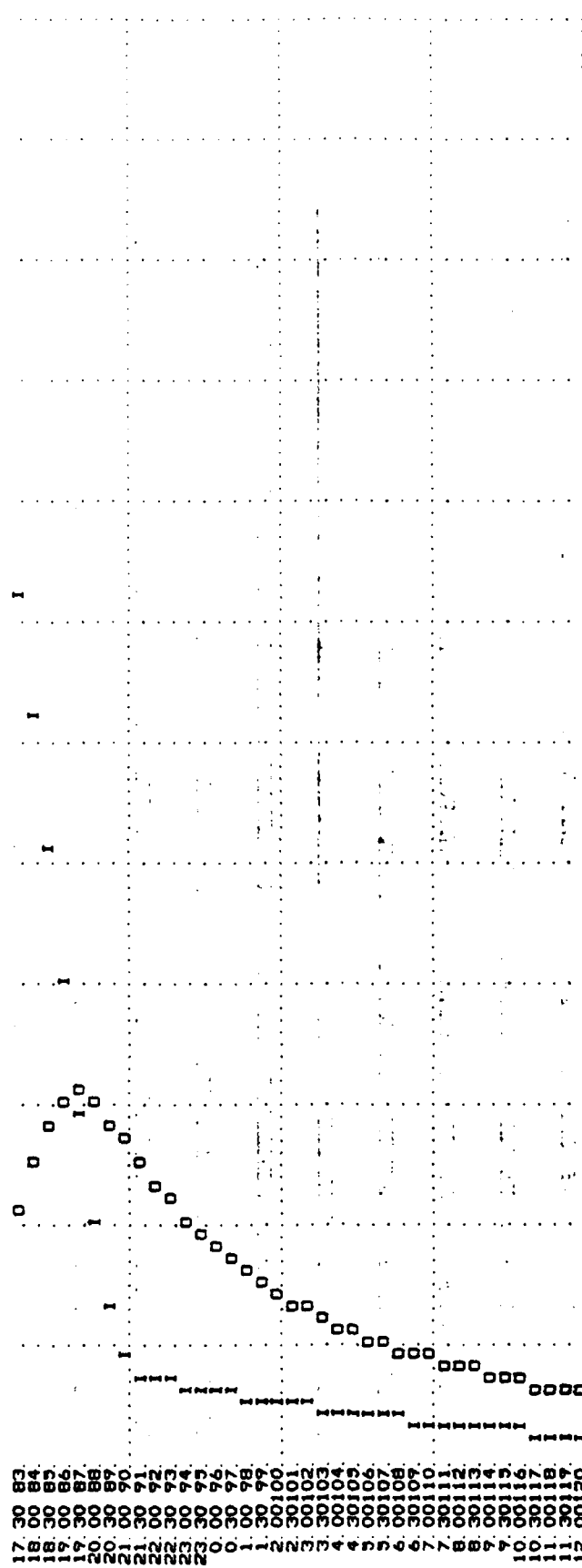
STATION 1

```
INFLOW(I), OUTFLOW(Q) AND OBSERVED FLOW(*)
150      200      250      300
```

[illegible]

FLAHERTY CIAVARA ASSOCIATES, P. C.

12 00 291  
13 00 261  
14 00 281  
15 00 291  
16 00 311  
17 00 321  
18 00 3301  
19 00 3401  
20 00 3501  
21 00 3601  
22 00 3701  
23 00 3801  
24 00 401  
25 00 411  
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27 00 431  
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29 00 451  
30 00 461  
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38 00 541  
39 00 551  
40 00 561  
41 00 571  
42 00 581  
43 00 591  
44 00 601  
45 00 611  
46 00 6201  
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62 00 7801  
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64 00 8001  
65 00 8101  
66 00 8201



**Abstract**

STATION 1, PLAN 1, RATIO 3  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 170. AT TIME 43.50 HOURS

**♦QVF♦**

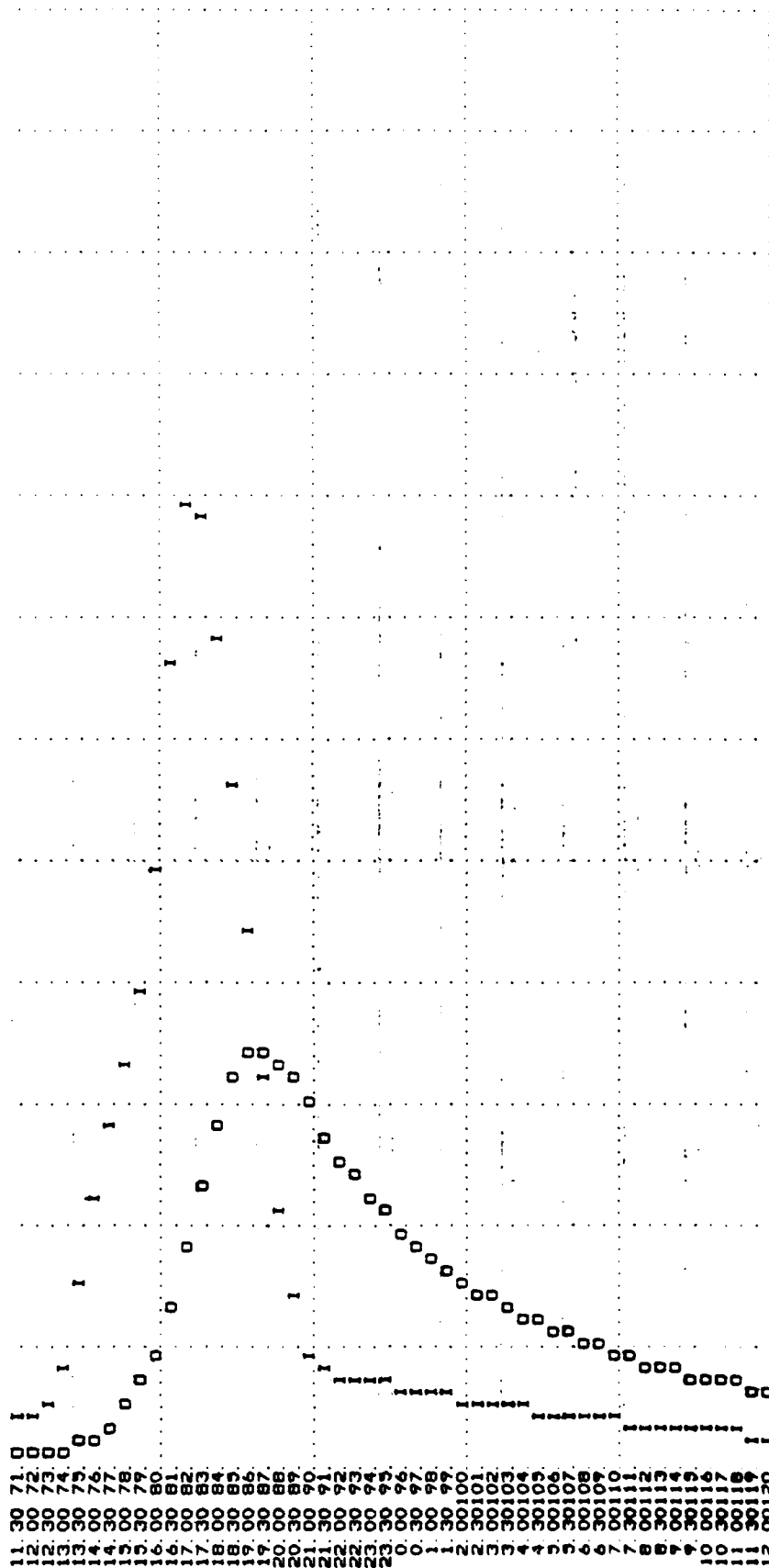
STATION	1
INFLOW(I);	OUTFLOW(O) AND OBSERVED FLOW(O*)
50	100
0	150
	200
	250
	300

[illegible]





FLAHERTY GIAVARA ASSOCIATES, P. C.



STATION 1, PLAN 1, RATIO 4  
END-OF-PERIOD HYDROGRAPH ORDINATES

0000

PEAK OUTFLOW IS 173. AT TIME 43.30 HOURS

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
173	146	74	30		3624
5	4	2	1		103
	3	10	10		10.81
	21	269	274		274.46
	132	35	72		150
	89	147	150		185
		181	185		185

◆QVF◆

STATION 1

	INFLOW(I),	OUTFLOW(O)	AND OBSERVED FLOW(*)
0	50	150	250
100	100	200	300

[illegible]

FLAHERTY GIAVARA ASSOCIATES, P. C.

[illegible]

591  
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4 30 611  
7 30 6201  
8 30 6301  
9 30 6401  
10 30 6501  
11 30 6601  
12 30 6701  
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15 30 7001  
16 30 7101  
17 30 7201  
18 30 7301  
19 30 7401  
20 30 7501  
21 30 7601  
22 30 7701  
23 30 7801  
24 30 7901  
25 30 8001  
26 30 8101  
27 30 8201  
28 30 8301  
29 30 8401  
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34 30 8901  
35 30 9001  
36 30 9101  
37 30 9201  
38 30 9301  
39 30 9401  
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42 30 9701  
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47 30 10201  
48 30 10301  
49 30 10401  
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59 30 11401  
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CFS  
CMS  
INCHES  
MM  
AC-FT  
THOUS CU M

3689.  
104.  
11.00  
279.33  
152  
188

31.  
1.  
11.00  
279.33  
152  
188

75.  
2.  
10.80  
274.24  
150.  
185.

148.  
4.  
5.31  
134.94  
74.  
91.

177.  
5.

\*OVF\*

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(\*)

0.	100.	150.	200.	250.	300.	350.	400.	450.	0.
0.11	0.30	0.11	0.30	0.11	0.30	0.11	0.30	0.11	0.30
1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30
6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30
7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30
8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30
10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30
11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30
12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30
13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30
14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30
15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30
16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30
17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30
18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30
19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30
20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30
21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30
22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30
23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30
26.30	26.30	26.30	26.30	26.30	26.30	26.30	26.30	26.30	26.30
27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30
28.30	28.30	28.30	28.30	28.30	28.30	28.30	28.30	28.30	28.30
29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30
30.30	30.30	30.30	30.30	30.30	30.30	30.30	30.30	30.30	30.30
31.30	31.30	31.30	31.30	31.30	31.30	31.30	31.30	31.30	31.30
32.30	32.30	32.30	32.30	32.30	32.30	32.30	32.30	32.30	32.30
33.30	33.30	33.30	33.30	33.30	33.30	33.30	33.30	33.30	33.30
34.30	34.30	34.30	34.30	34.30	34.30	34.30	34.30	34.30	34.30
35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30
36.30	36.30	36.30	36.30	36.30	36.30	36.30	36.30	36.30	36.30
37.30	37.30	37.30	37.30	37.30	37.30	37.30	37.30	37.30	37.30
38.30	38.30	38.30	38.30	38.30	38.30	38.30	38.30	38.30	38.30
39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30
40.30	40.30	40.30	40.30	40.30	40.30	40.30	40.30	40.30	40.30
41.30	41.30	41.30	41.30	41.30	41.30	41.30	41.30	41.30	41.30
42.30	42.30	42.30	42.30	42.30	42.30	42.30	42.30	42.30	42.30
43.30	43.30	43.30	43.30	43.30	43.30	43.30	43.30	43.30	43.30
44.30	44.30	44.30	44.30	44.30	44.30	44.30	44.30	44.30	44.30
45.30	45.30	45.30	45.30	45.30	45.30	45.30	45.30	45.30	45.30
46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30

23 30 471  
0 30 481  
0 30 491  
1 30 501  
2 30 511  
2 30 521  
3 30 531  
3 30 541  
4 30 551  
5 30 561  
5 30 571  
5 30 581  
6 30 591  
6 30 601  
7 30 611  
7 30 621  
8 30 631  
8 30 641  
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9 30 661  
10 30 671  
10 30 681  
11 30 691  
11 30 701  
12 30 711  
12 30 721  
13 30 731  
13 30 741  
14 30 751  
14 30 761  
15 30 771  
15 30 781  
16 30 791  
16 30 801  
17 30 811  
17 30 821  
18 30 831  
18 30 841  
19 30 851  
19 30 861  
20 30 871  
20 30 881  
21 30 891  
21 30 901  
22 30 911  
22 30 921  
23 30 931  
23 30 941  
24 30 951  
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25 30 971  
25 30 981  
26 30 991  
26 30 1001  
27 30 1011  
27 30 1021  
28 30 1031  
28 30 1041





[illegible]

PEAK OUTFLOW IS 182. AT TIME 43.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CPB	182.	151.	77.	31.		3754.
CMS	5.	4.	2.	1.		106.
INCHES		5.42	10.97	11.19		11.19
MM		137.60	279.07	284.27		284.27
CU M		73.	152.	135.		135.
ACFT		93	188.	191.		191.

**\*DVF\***

STATION

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(\*)

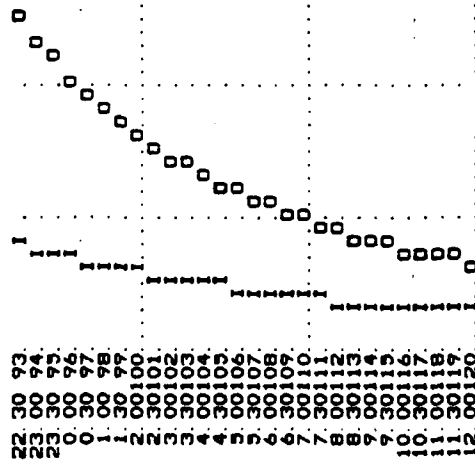
[illegible]

450 0 0 0 0

FLAHERTY GIAVARA ASSOCIATES, P. C.

350 I  
30 360 I  
18 30 370 I  
19 30 380 I  
19 30 390 I  
20 30 400 I  
20 30 411  
21 30 421  
21 30 431  
21 30 441  
22 30 451  
22 30 461  
22 30 471  
22 30 481  
22 30 491  
22 30 501  
22 30 511  
22 30 521  
22 30 531  
22 30 541  
22 30 551  
22 30 561  
22 30 571  
22 30 581  
22 30 591  
22 30 601  
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22 30 981  
22 30 991  
22 30 1001

FLAHERTY GIAVARA ASSOCIATES, P. C.



\*OVN\*

STATION 1, PLAN 1, RATIO 7  
END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW	STORAGE
000001127	0000001
174	0000001
178	0000001
181	0000001
184	0000001
187	0000001
190	0000001
193	0000001
196	0000001
199	0000001
202	0000001
205	0000001
208	0000001
211	0000001
214	0000001
217	0000001
220	0000001
223	0000001
226	0000001
229	0000001
232	0000001
235	0000001
238	0000001
241	0000001
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247	0000001
250	0000001
253	0000001
256	0000001
259	0000001
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265	0000001
268	0000001
271	0000001
274	0000001
277	0000001
280	0000001
283	0000001
286	0000001
289	0000001
292	0000001
295	0000001
298	0000001
301	0000001
304	0000001
307	0000001
310	0000001
313	0000001
316	0000001
319	0000001
322	0000001
325	0000001
328	0000001
331	0000001
334	0000001
337	0000001
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343	0000001
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412	0000001
415	0000001
418	0000001
421	0000001
424	0000001
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439	0000001
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463	0000001
466	0000001
469	0000001
472	0000001
475	0000001
478	0000001
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631	0000001
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637	0000001
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694	0000001
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724	0000001
727	0000001
730	0000001
733	0000001
736	0000001
739	0000001
742	0000001
745	0000001
748	0000001
751	0000001
754	0000001
757	0000001
760	0000001
763	0000001
766	0000001
769	0000001
772	0000001
775	0000001
778	0000001
781	0000001
784	0000001
787	0000001
790	0000001
793	0000001
796	0000001
799	0000001
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808	0000001
811	0000001
814	0000001
817	0000001
820	0000001
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835	0000001
838	0000001
841	0000001
844	0000001
847	0000001
850	0000001
853	0000001
856	0000001
859	0000001
862	0000001
865	0000001
868	0000001
871	0000001
874	0000001
877	0000001
880	0000001
883	0000001
886	0000001
889	0000001
892	0000001
895	0000001
898	0000001
901	0000001
904	0000001
907	0000001
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913	0000001
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925	0000001
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934	0000001
937	0000001
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943	0000001
946	0000001
949	0000001
952	0000001
955	0000001
958	0000001
961	0000001
964	0000001
967	0000001
970	0000001
973	0000001
976	0000001
979	0000001
982	0000001
985	0000001
988	0000001
991	0000001
994	0000001
997	0000001
1000	0000001

PEAK OUTFLOW IS 189. AT TIME 43.30 HOURS

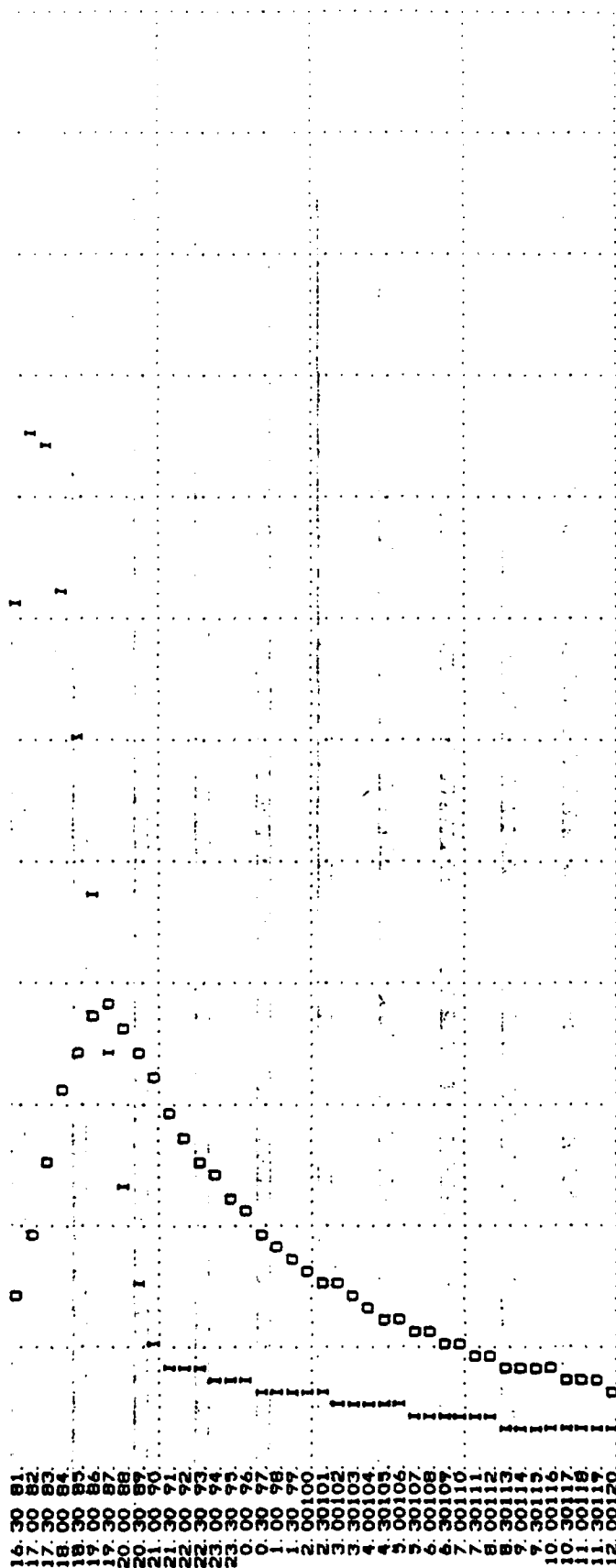
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
GFS	189	155	78	32		3817
CMS	5	4	2	1		108
INCHES		5.53	11.18	11.39		11.39
MM		140.44	283.94	289.23		289.23
AC-FT		95	155	158		158
THOUS CU M		77	191	195		195

**\*DVF\***

[illegible]

FLAHERTY GIARARA ASSOCIATES, P.C.

11 30 00 231  
12 30 00 241  
13 30 00 251  
14 30 00 261  
15 30 00 271  
16 30 00 281  
17 30 00 291  
18 30 00 301  
19 30 00 311  
20 30 00 321  
21 30 00 3301  
22 30 00 3401  
23 30 00 350  
24 30 00 360  
25 30 00 3701  
26 30 00 3801  
27 30 00 3901  
28 30 00 4001  
29 30 00 411  
30 30 00 421  
31 30 00 431  
32 30 00 441  
33 30 00 451  
34 30 00 461  
35 30 00 471  
36 30 00 481  
37 30 00 491  
38 30 00 501  
39 30 00 511  
40 30 00 521  
41 30 00 531  
42 30 00 541  
43 30 00 551  
44 30 00 561  
45 30 00 571  
46 30 00 581  
47 30 00 591  
48 30 00 601  
49 30 00 611  
50 30 00 6201  
51 30 00 630  
52 30 00 640  
53 30 00 650  
54 30 00 660  
55 30 00 670  
56 30 00 680  
57 30 00 690  
58 30 00 700  
59 30 00 710  
60 30 00 720  
61 30 00 730  
62 30 00 740  
63 30 00 750  
64 30 00 760  
65 30 00 770  
66 30 00 780  
67 30 00 790  
68 30 00 800



**#DYN#**

STATION 1; PLAN 1; RATIO 8  
END-OF-PERIOD HYDROGRAPH ORDINATES

0000N-NN  
0000N-NN  
0000N-NN  
0000N-NN  
OUTFLOW  
0000N-NN  
0000N-NN  
0000N-NN  
0000N-NN

PEAK OUTFLOW IS 197. AT TIME 43.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CBS	197.	158.	79.	32.	3884.	
CMS	6.	4.	2.	1.	110.	
INCHES		5.65	11.37	11.58		11.58
MM		143.42	288.77	294.13		294.13
CU-FT		78.	158.	160.		160.
THOUS CU M		97.	194.	198.		198.

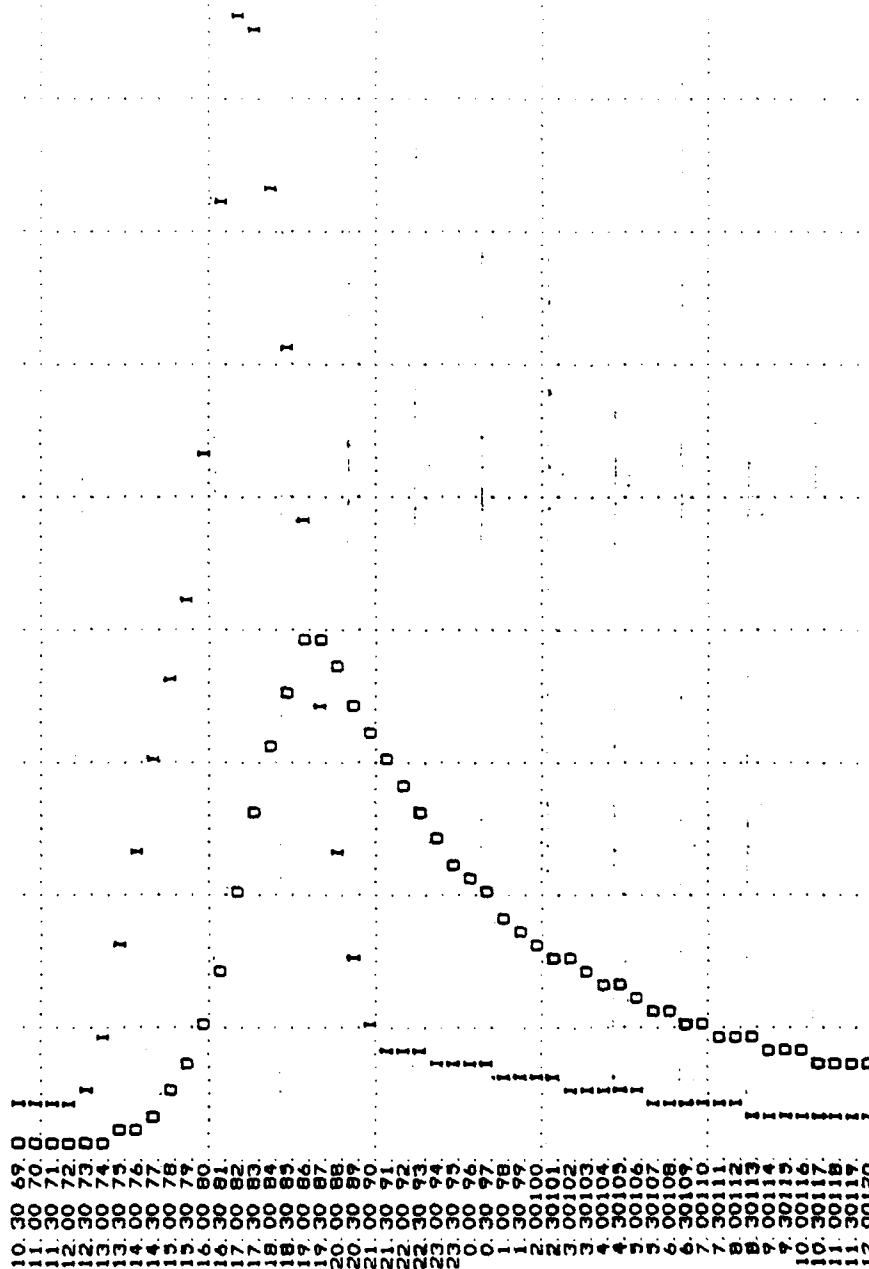
•DVF•

INFLW(I),	OUTFLOW(O)	AND OBSERVED FLOW(=)	STATION	1
0.	100	150.		
50.	200	250		
	300			

111  
30 121  
5 30 131  
6 30 141  
7 30 151  
8 30 161  
9 30 171  
10 30 181  
11 30 191  
12 30 201  
13 30 211  
14 30 221  
15 30 231  
16 30 241  
17 30 251  
18 30 261  
19 30 271  
20 30 281  
21 30 291  
22 30 301  
23 30 311  
24 30 321  
25 30 331  
26 30 341  
27 30 351  
28 30 361  
29 30 371  
30 30 381  
31 30 391  
32 30 401  
33 30 411  
34 30 421  
35 30 431  
36 30 441  
37 30 451  
38 30 461  
39 30 471  
40 30 481  
41 30 491  
42 30 501  
43 30 511  
44 30 521  
45 30 531  
46 30 541  
47 30 551  
48 30 561  
49 30 571  
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57 30 651  
58 30 661  
59 30 671  
60 30 681



FLAHERTY GIAVARA ASSOCIATES, P. C.



STATION 1, PLAN 1, RATIO 9

\*OVN\*

## END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 503. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CM	503	298	127	52	6221	6221
CMS	14	8	4	1	176	176
INCHES		10.66	18.21	18.55	18.55	18.55
MM		270.87	462.60	471.09	471.09	471.09
CU-FT		148	352	257	257	257
THOUS AC M		182	311	317	317	317

STATION 11

AD-A110 118

FLAHERTY-GIAVARA ASSOCIATES NEW HAVEN CT  
NATIONAL DAM SAFETY PROGRAM. NOE POND DAM (INVENTORY NUMBER NY --ETC(U)  
JUL 81 H C FLAHERTY

F/O 13/13

DACW51-81-C-0006

NL

IMCI ACKETED

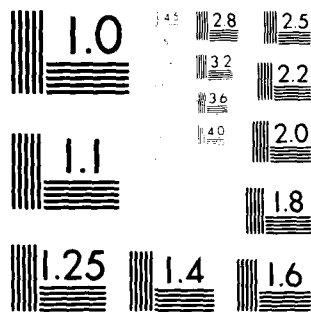
2 OF 2  
PAGE 1

END

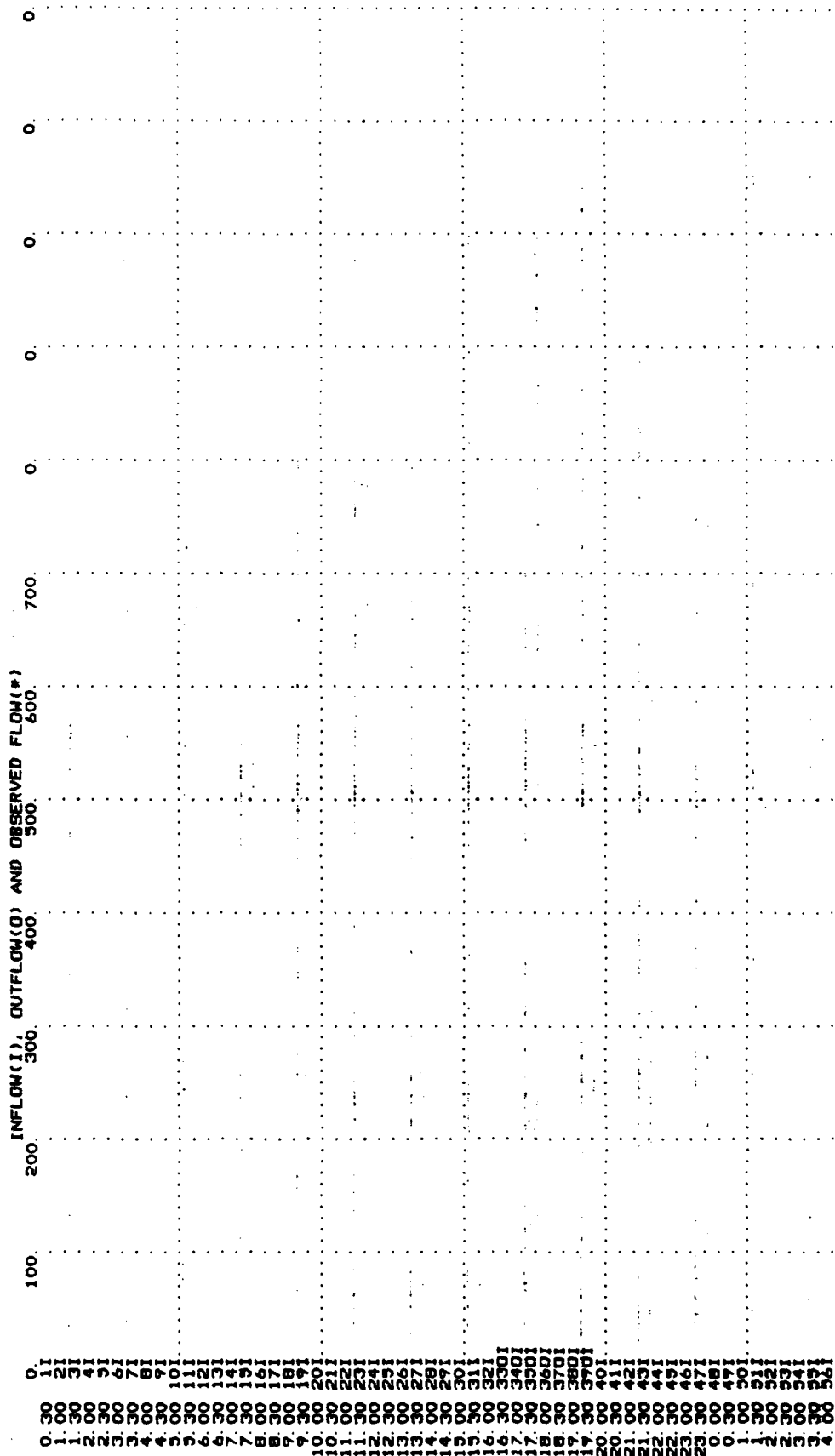
DATE  
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8-82

DTIC



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



FLAHERTY OIAVARA ASSOCIATES, P. C.

[illegible]

C-48

SPENDING • EYE TRACK • PATENT PENDING

9 30115 1 0  
10 30116 1 0  
11 30117 1 0  
12 30118 1 0  
13 30119 1 0  
14 30120 1 0

\*OVN\*

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
				0.50	0.55	0.60	0.61	0.62	0.63	0.64	0.65	0.66
HYDROGRAPH AT	1	0.26 (0.67)	1	330 (9.35)	363 (10.28)	376 (11.22)	403 (11.41)	409 (11.59)	416 (11.78)	423 (11.97)	429 (12.15)	460 (18.70)
ROUTED TO	1	0.26 (0.67)	1	135 (3.82)	153 (4.32)	170 (4.81)	173 (4.91)	177 (5.01)	182 (5.15)	189 (5.36)	197 (5.58)	503 (14.26)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION STORAGE OUTFLOW	INITIAL VALUE 1630.00 0.	SPILLWAY CREST 1630.00 0.	TOP OF DAM 1632.50 174. 178.
--------	---------------------------------	--------------------------------	---------------------------------	---------------------------------------

RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1632.08	0.00	78	139	0.00	43.50	0.00
0.55	1632.25	0.00	85	153	0.00	43.50	0.00
0.60	1632.42	0.00	91	170	0.00	43.50	0.00
0.61	1632.45	0.00	93	173	0.00	43.50	0.00
0.62	1632.47	0.00	94	177	0.00	43.50	0.00
0.63	1632.52	0.02	95	182	1.50	43.50	0.00
0.64	1632.55	0.03	96	189	1.50	43.50	0.00
0.65	1632.58	0.08	97	197	1.50	43.50	0.00
1.00	1633.12	0.62	117	503	4.00	42.50	0.00

\*\*\*\*\*  
FLOOD HYDROGRAPH PACKAGE (HEC-1)  
DAM SAFETY VERSION JULY 1978  
LAST MODIFICATION 26 FEB 79  
\*\*\*\*\*

PAGE 0040

FLAHERTY GIOVANA ASSOCIATES, P.C.

C-50

REPRODUCTION OF THIS DOCUMENT IS PROHIBITED



APPENDIX D

PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS

PREVIOUS REPORTS

CONSTRUCTION LAYOUT:  
STREETS, HIGHWAYS  
BUILDINGS  
STRUCTURES

LEON KALMUS

*Land Surveyor*

418 CHESTNUT STREET  
ONEONTA, N. Y. - 13820

PHONE 607-432-3200

NYS LIC. NO. 26695LS

BOUNDARY SURVEYS  
SUBDIVISION  
TOPOGRAPHIC SURVEYS  
CONTROL SURVEYS

February 28, 1968

Leatherstocking Corp.  
19 Main Street  
Cooperstown, N.Y. 13326

Att: Mr. Bruce Rathbone

Dear Mr. Rathbone:

This is to confirm our telephone conversation of this date regarding the area of Moe Pond.

ASCS photograph No. EHH, 1AA, 42, dated 5/27/60 was used to planimeter the area of Moe Pond. Two successive planimeter readings gave an area of 39 acres. The distortion in this photograph, which would tend to enlarge all objects, was estimated to be approximately 10%.

Therefore, the estimated surface area of Moe Pond was given to you as 35 acres more or less.

Very truly yours,

*Leon Kalmus*

Leon Kalmus, L.S.

LK/e

PREVIOUS INSPECTION REPORTS

GORDON H. REYNOLDS  
PROFESSIONAL ENGR. AND LAND SURVEYOR  
110 FAIR STREET  
COOPERSTOWN, NEW YORK  
PHONE ~~XXX~~ 547-9628

May 31, 1972

Leatherstocking Corporation  
Cooperstown, N. Y. 13326

Attention: Mr. Bruce Rathbone

Re: Inspection of dam at Moe Pond

Dear Bruce:

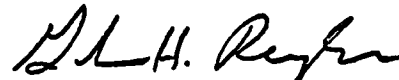
The subject dam was inspected after the heavy rains on May 22, 1972. About 1 inch of water was flowing over the spillway. No seepage was noted at the toe of the dam.

A combination of high water and the lubrication of the soil under an earth fill dam caused by percolation of water can cause failure of an earth filled dam.

In the case of Moe Pond, heavy rains cause only a small increase in water level. This is because the pond is larger in comparison to the total drainage area. The water spreads out - not up. Further, the Moe Pond is surrounded by woodland. This condition slows down the run-off and thereby lessens the chance for a high water condition.

In view of the fact that percolation through the dam and high water condition do not exist during and after heavy rains, I conclude that the Moe Pond Dam is a very safe structure indeed.

Very truly yours,



Gordon H. Reynolds

GHR:mg

APPENDIX E  
STRUCTURAL STABILITY ANALYSIS





Loading Case: Normal

$$F_H = 15.34^K + 1.19^K = 16.53^K/Ft$$

$$M_{OT} = 1560.5 + 16 + 9.6 = 1584.1^K$$

$$M_{ecc} = 34.2^K$$

$$F_v = 11.4^K$$

$$F_p = .38^K/s =$$

$$F_{rp} = 19' \times .38 \times \frac{19}{2} = 68.6^K$$

$$M_{RPP} = 68.6 \times \frac{19}{3} = 434.4^K$$

$$F.S.O.T. = \frac{34.2 + 434.4}{1584.1^K} = 2.55 \text{ OK}$$

$$F.S.SL = \frac{(11.4 - 2.9) \cdot 6 + 68.6}{16.53^K} = 4.48 \text{ OK}$$

Loading Case: Normal + Ice

$$F_H = 16.53 + 5 = 21.53^K/Ft$$

$$M_{OT} = 1584.1 + 5 \times 22 = 2694.1^K$$

$$F.S.O.T. = \frac{468.6}{2694.1} = 1.59 \text{ Less than desirable}$$

$$F.S.SL = \frac{9 \times 6 + 68.6}{21.53} = 3.44 \text{ OK}$$

Earth embankments both sides provides stability, loc. of res.  
N/A





Loading Case: Max Oper.

$$F_H = 15.34K + 3K = 18.34K$$

$$M_o = 158.5 + 40.5 = 199'K + 9.6 = 203.6'K$$

$$F_v = 11.4$$

$$T_o = 2.4$$

$$F_{H_{max}} = 1.6$$

$$F_{H_{max}} = 45.34$$

$$F.S. o.T. = \frac{468.6}{203.6} = 2.25 \text{ OK}$$

$$F.S. SL = \frac{54 + 68.6}{18.34} = 4.03 \text{ OK}$$

Loading Case: P.M.F.

Ht. of water 3.0' above spillway

$$F_H = 3.56 + 15.34 = 18.9K$$

$$M_o = 158.5 + 48.16 + 9.6 = 216.16'K$$

$$F.S. o.T. = \frac{468.6}{216.16} = 2.17 \text{ OK}$$

$$F.S. SL = \frac{(11.4 - 2.4) \times 1.6 + 68.6}{18.9} = 3.92 \text{ OK}$$

Loc. of res. N/A

APPENDIX F

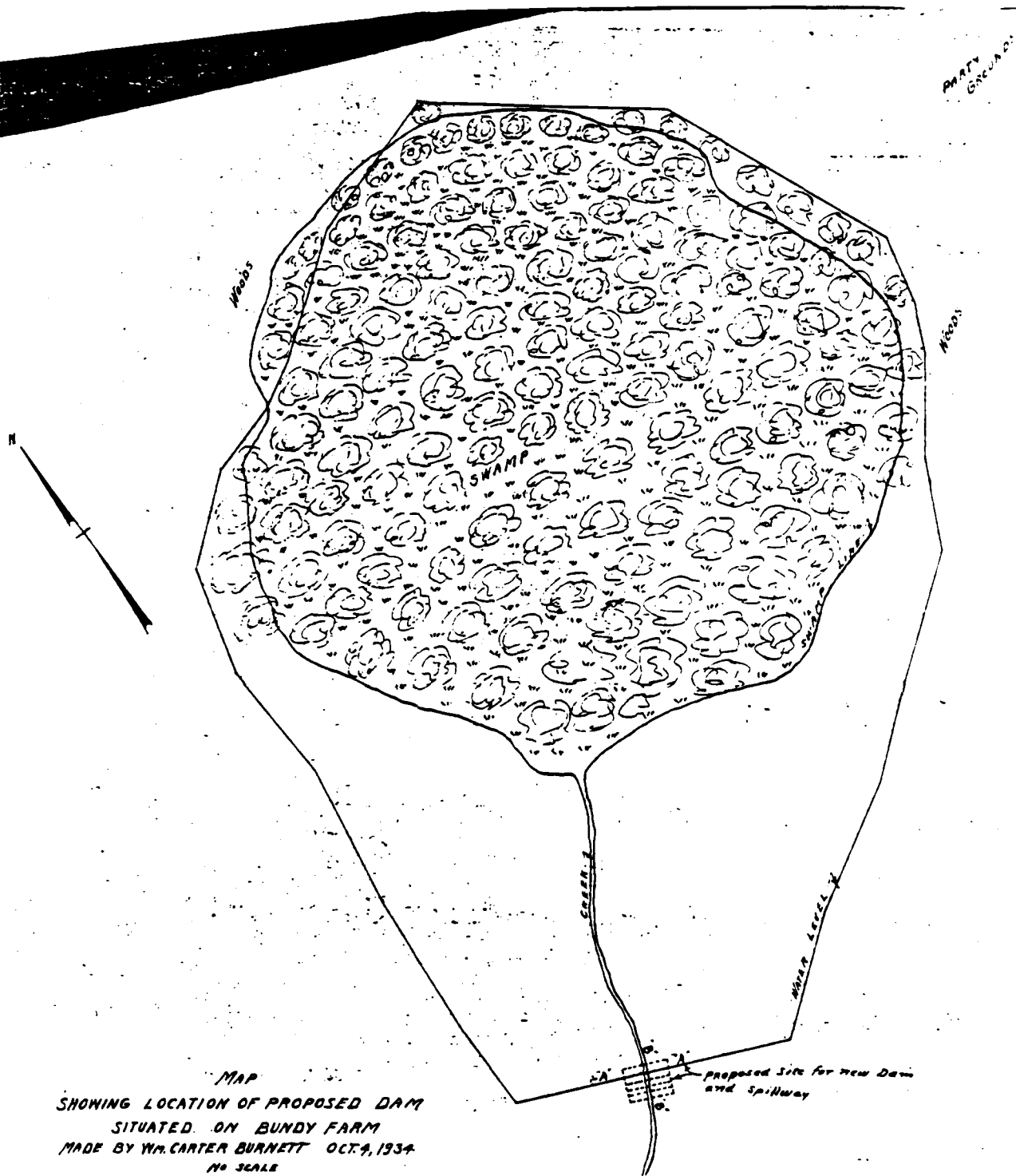
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## REFERENCES

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4. King, Horace and Brater, Ernest. Handbook of Hydraulics, 5th Edition. McGraw-Hill Book Company, New York, New York, 1963.
5. Riedel, J.T., Appleby, J.F. and Schloemer, R.W. Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1000 Square Miles and Durations of 6, 12, 24, and 48 Hours (Hydrometeorological Report No. 33) U.S. Department of Commerce - Weather Bureau and U.S. Department of the Army - Corps of Engineers, Washington, D.C., April 1956
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APPENDIX G

DRAWINGS



TOP OF PROPOSED DAM

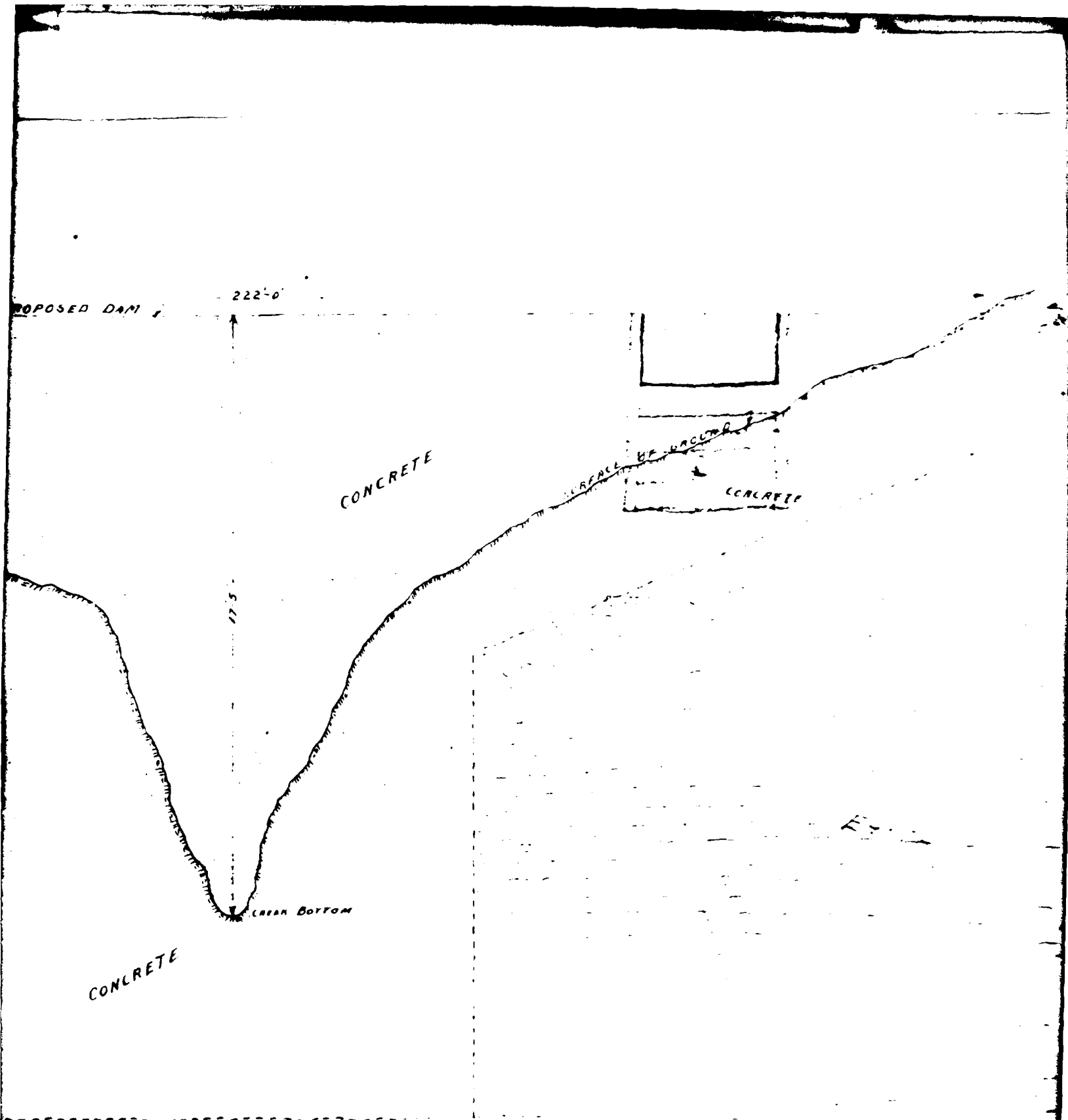
CONCRETE

SURFACE OF GROUND

PROP

CON

SECTION THRU A-A SHOWING  
PROP



SHOWING PRESENT SURFACE OF GROUND AND HEIGHT OF PROPOSED DAM

SCALE { HORIZONTAL 1" = 10'  
VERTICAL 1" = 10'

